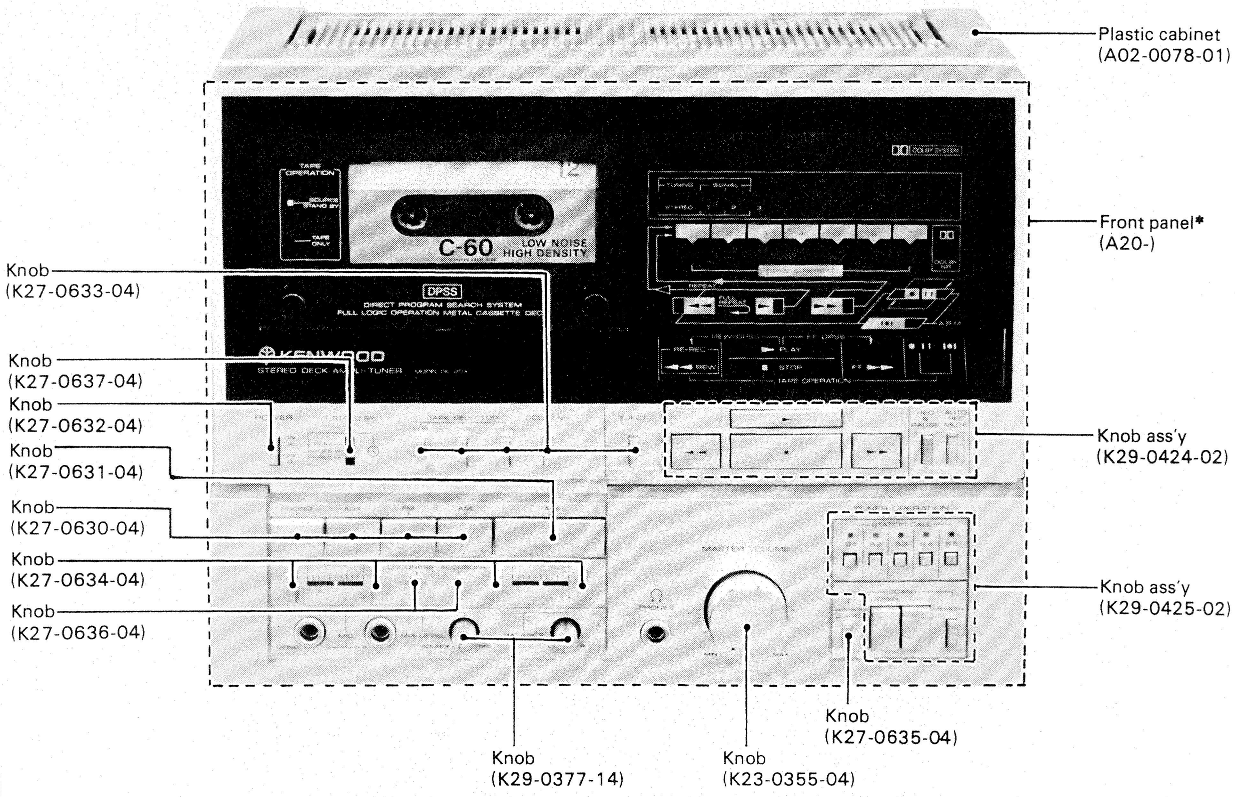
KENWOOD®

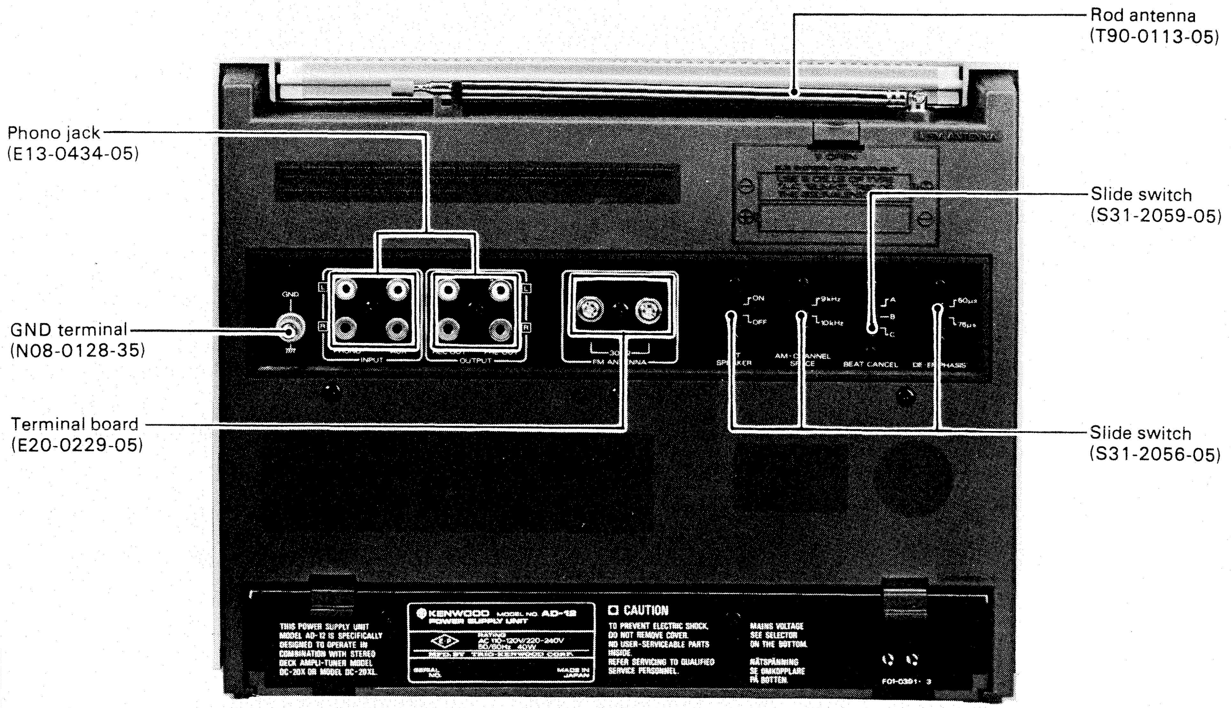
DC-20X/P/S

STEREO DECK AMPLI-TUNER/ STEREO POWER AMPLIFIER/SPEAKER

SERVICE MANUAL

DC-20X


Plastic cabinet (A02-0078-01)
Front panel* (A20-)
Knob ass'y (K29-0424-02)
Knob ass'y (K29-0425-02)
Knob (K27-0633-04)
Knob (K27-0637-04)
Knob (K27-0632-04)
Knob (K27-0631-04)
Knob (K27-0630-04)
Knob (K27-0634-04)
Knob (K27-0636-04)
Knob (K27-0635-04)
Knob (K29-0377-14)
Knob (K23-0355-04)
C-60
DPSS
KENWOOD
STEREO DECK AMPLI-TUNER

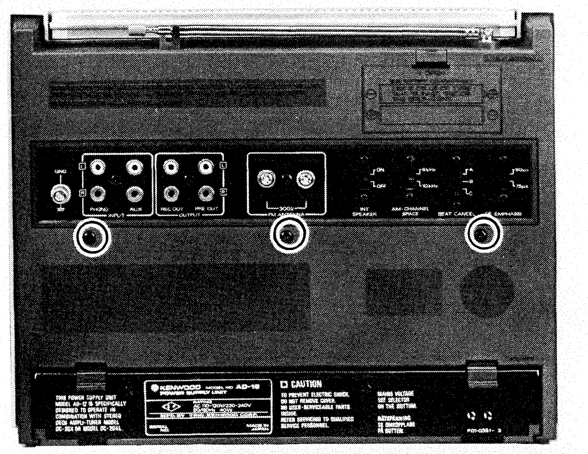

Rod antenna (T90-0113-05)
Phono jack (E13-0434-05)
Slide switch (S31-2059-05)
GND terminal (N08-0128-35)
Terminal board (E20-0229-05)
Slide switch (S31-2056-05)
INPUT
OUTPUT
FM ANTENNA
KENWOOD MODEL NO. AD-12 POWER SUPPLY UNIT
CAUTION

* Refer to Parts List on page 58.

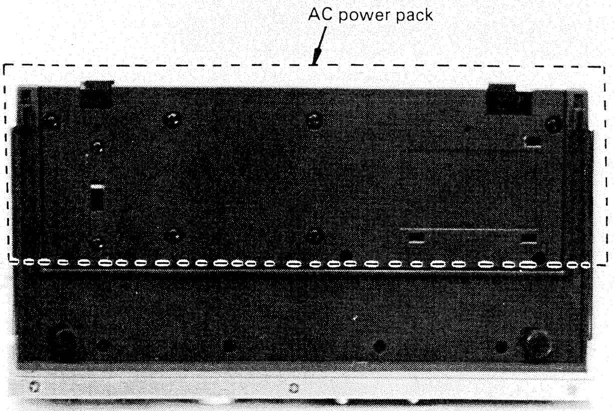
DISASSEMBLY FOR REPAIR

1. Removal of Plastic Cabinet

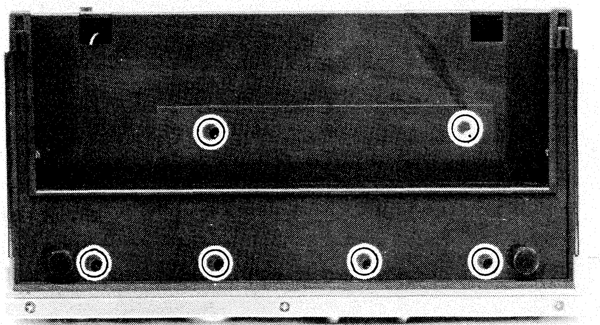
① Remove 3 screws.



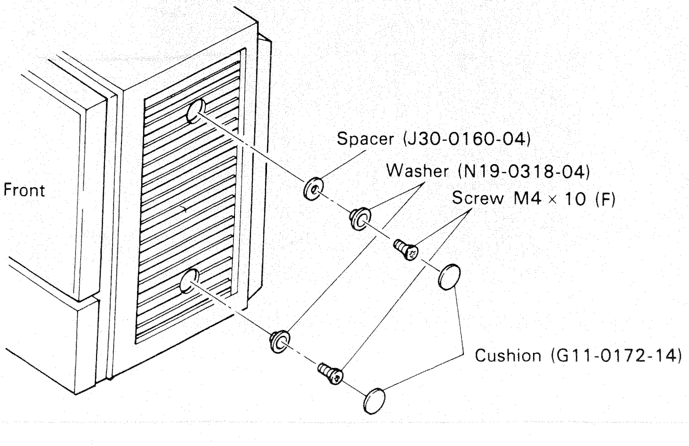
② Push down on the right and left locking claws and pull out an AC power pack (AD-12).


AC power pack

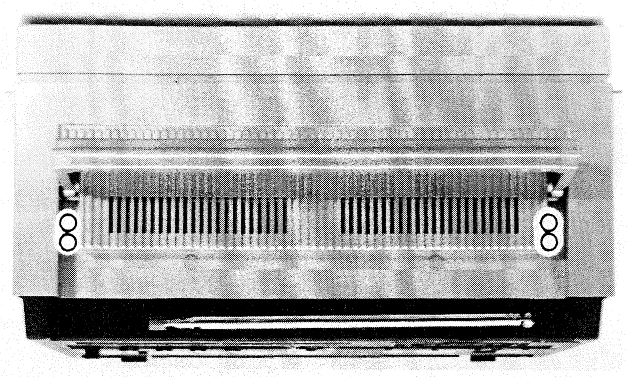
③ Remove 6 screws.



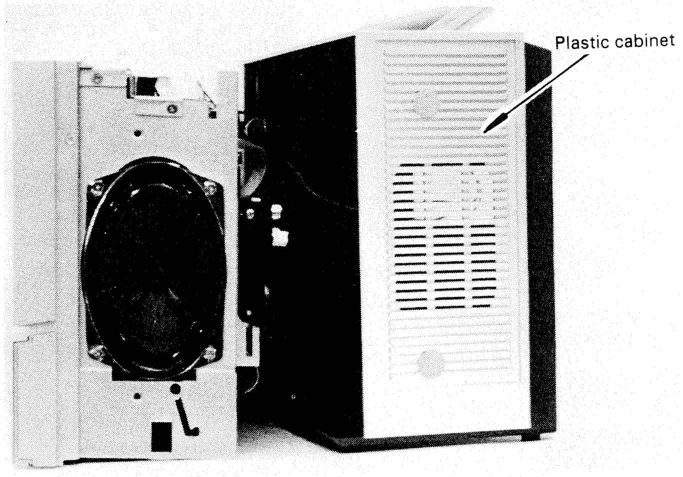
④ Remove the screws.


Front
Spacer (J30-0160-04)
Washer (N19-0318-04)
Screw M4 × 10 (F)
Cushion (G11-0172-14)

⑤ Remove 4 screws.



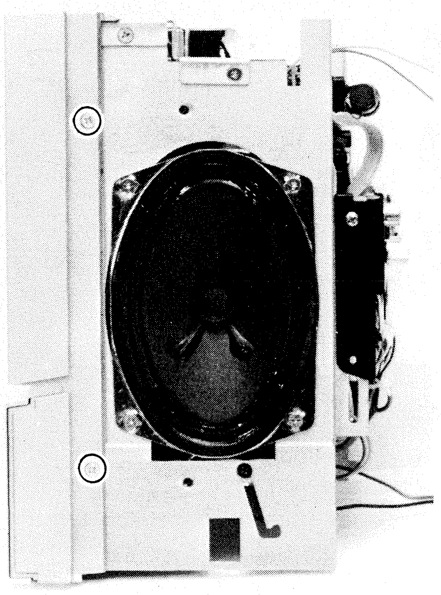
⑥ The plastic cabinet can be removed.


Plastic cabinet

When checking the circuit, cut 5 leads (black and red leads for power supply, brown and red leads for battery back-up and blue lead for FM rod antenna). Then connect the ⊕ terminal to the red lead and the ⊖ terminal to the blank lead, respectively.

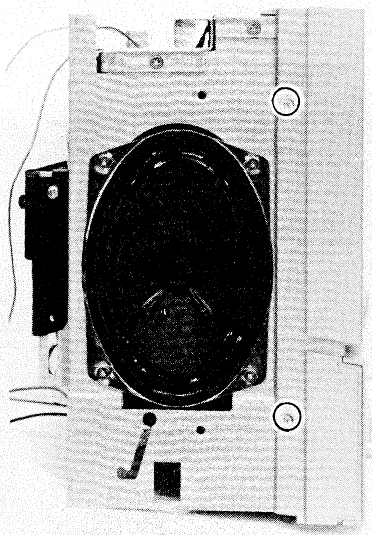
2. Removal of Front Panel

① Remove 2 screws.

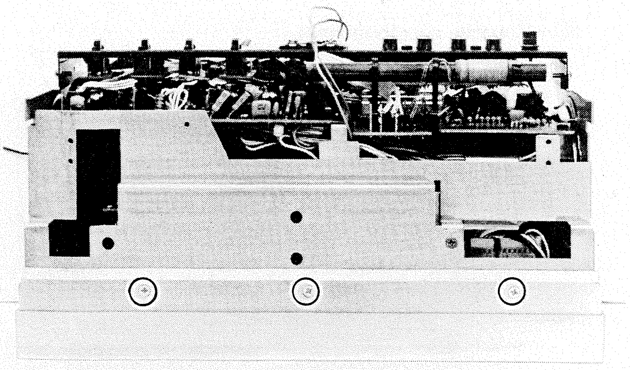


DISASSEMBLY FOR REPAIR

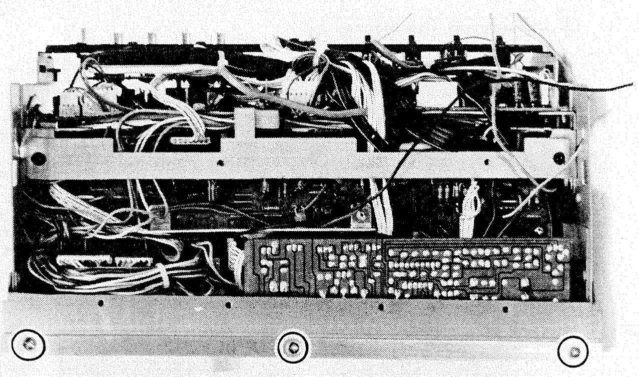
② Remove 2 screws.



③ Remove 3 screws.



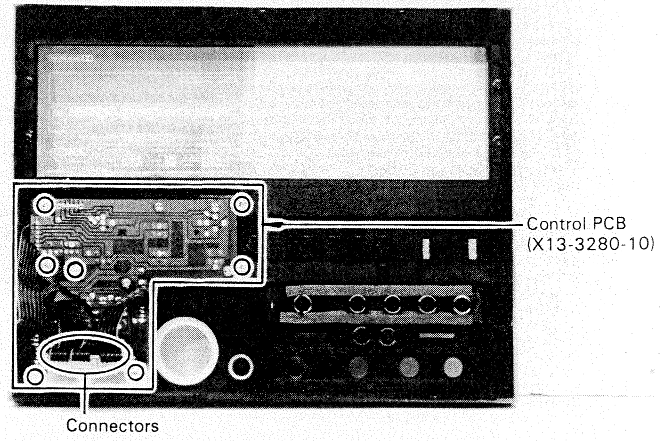
④ Remove 3 screws.



The front panel can be removed by pulling out the connectors as shown in the next photograph.

3. Removal of Control PCB (X13-3280-10)

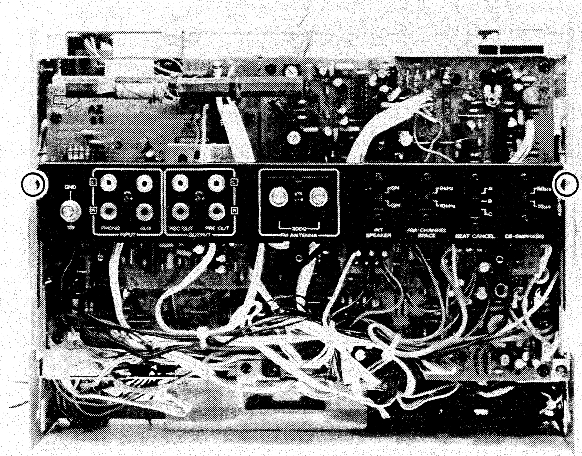
① Remove 7 screws.



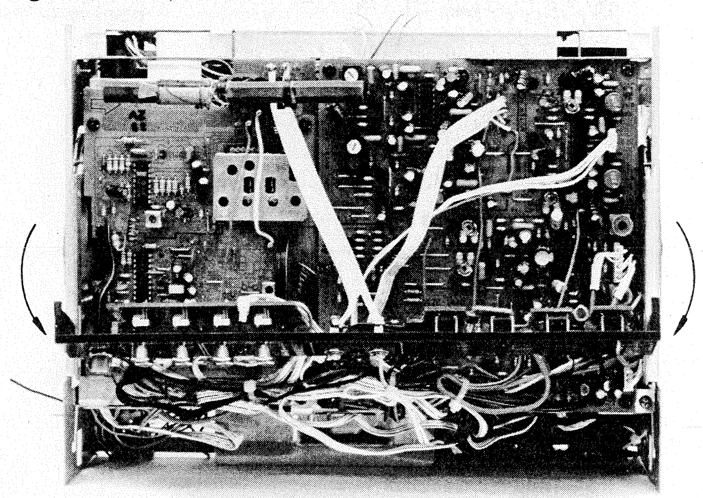
The control PCB can be removed.

4. Moving of Rear Panel

① Remove 2 screws.



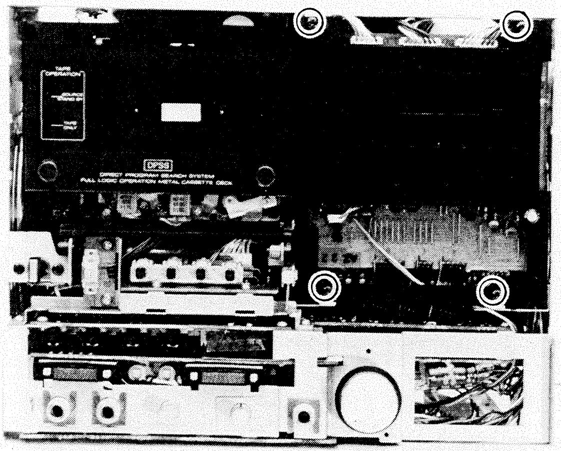
② The rear panel can be moved.



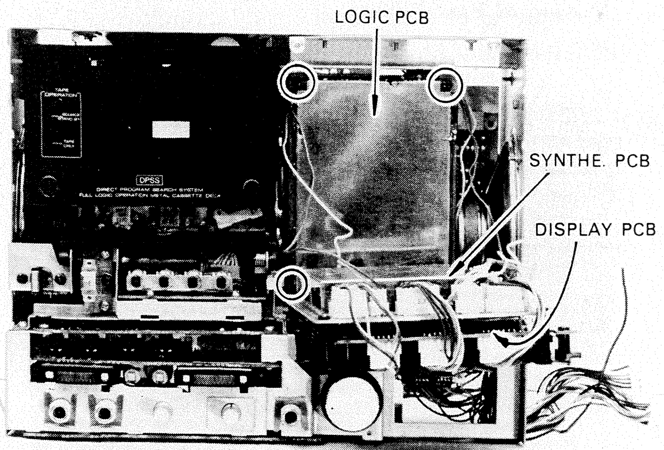
DISASSEMBLY FOR REPAIR

5. Removal of DISPLAY, SYNTHE. and LOGIC PCBs

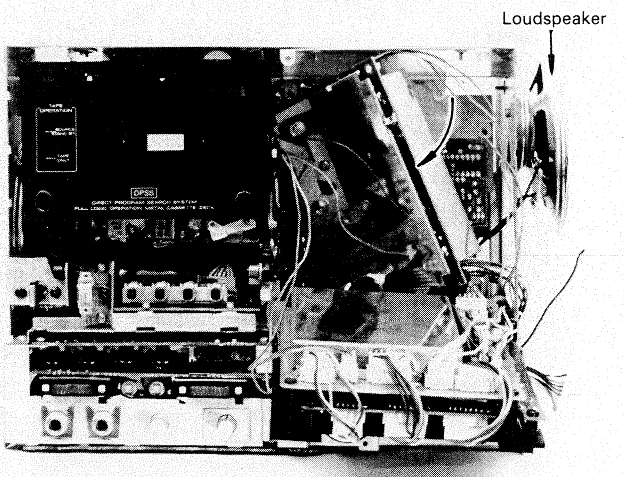
① Remove 4 screws.



② Pull out DISPLAY and SYNTHE. PCBs toward you.

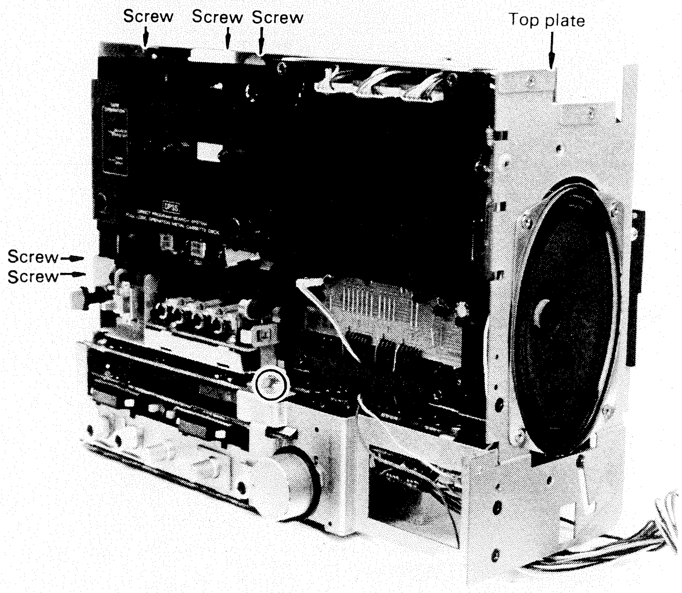

LOGIC PCB
SYNTHE. PCB
DISPLAY PCB

③ Remove 3 screws as shown in the above figure and the loudspeaker. Then turn LOGIC PCB as shown.

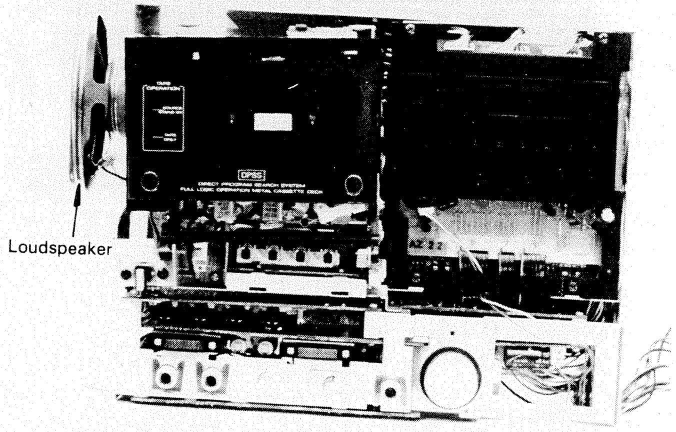

Loudspeaker

6. Removal of Cassette Deck Mechanism

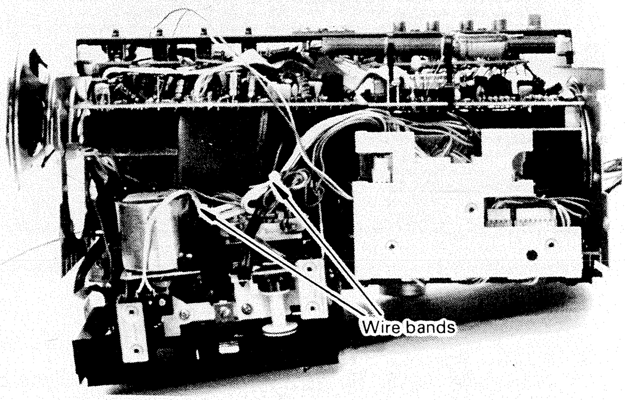
① Remove 6 screws.


Screw
Screw
Screw
Top plate
Screw
Screw

② Remove the loudspeaker.


Loudspeaker

③ Remove the top plate.

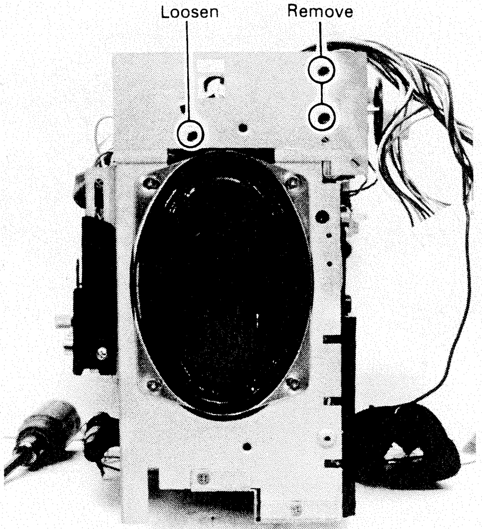


When checking the cassette deck mechanism, cut the wire bands and pull out the mechanism toward you.

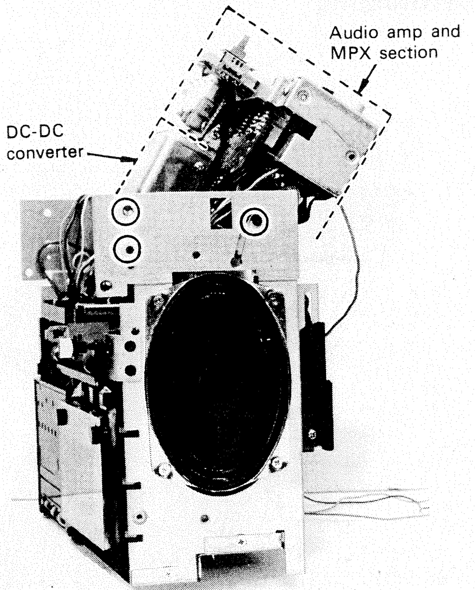
DISASSEMBLY FOR REPAIR

7. Removal of Audio Amp and MPX Section

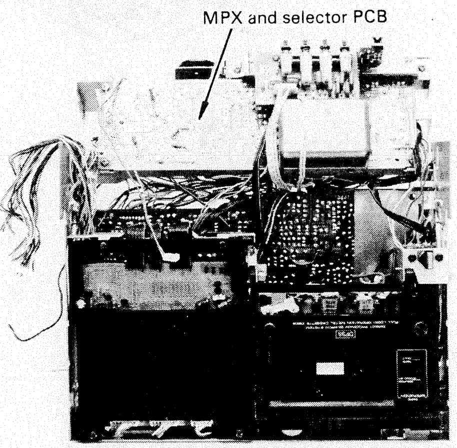
① Remove 4 screws (2 screws for each side) and loosen 2 screws (1 screw for each side).


Loosen
Remove

② Move the audio amp and MPX section as shown.

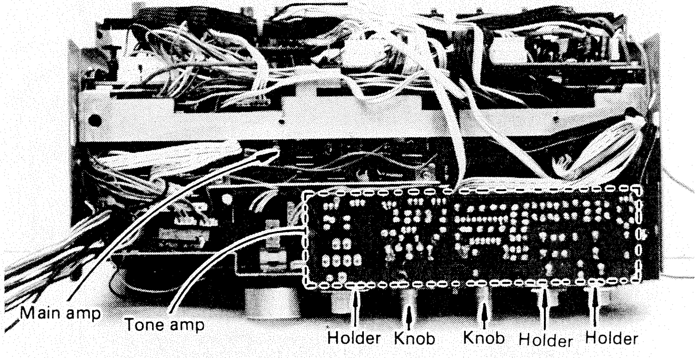

Audio amp and MPX section
DC-DC converter

③ Another view

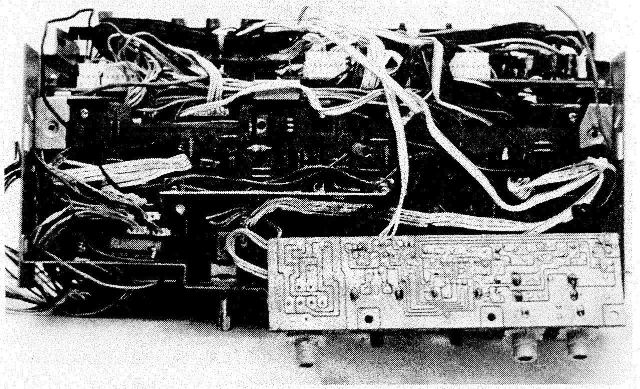

MPX and selector PCB

8. Removal of Main Amp and Tone Amp PCBs.

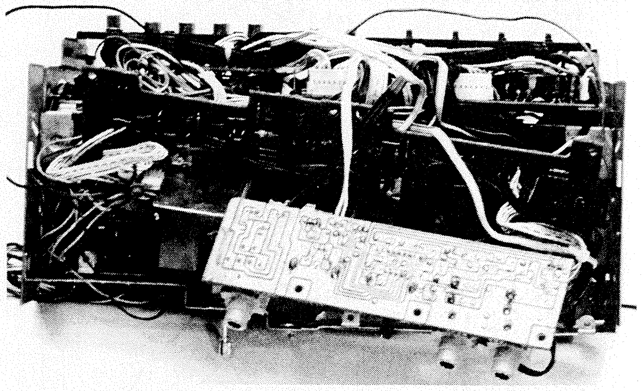
① Remove 3 screws and 2 knobs and 3 holders.


Main amp
Tone amp
Holder
Knob
Knob
Holder
Holder

② Remove the tone amp PCB.

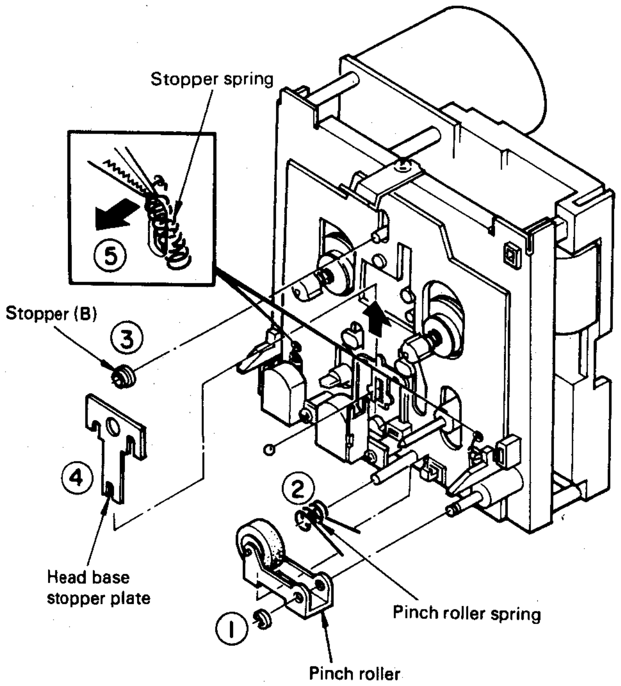


③ The main amp PCB can be removed as shown.



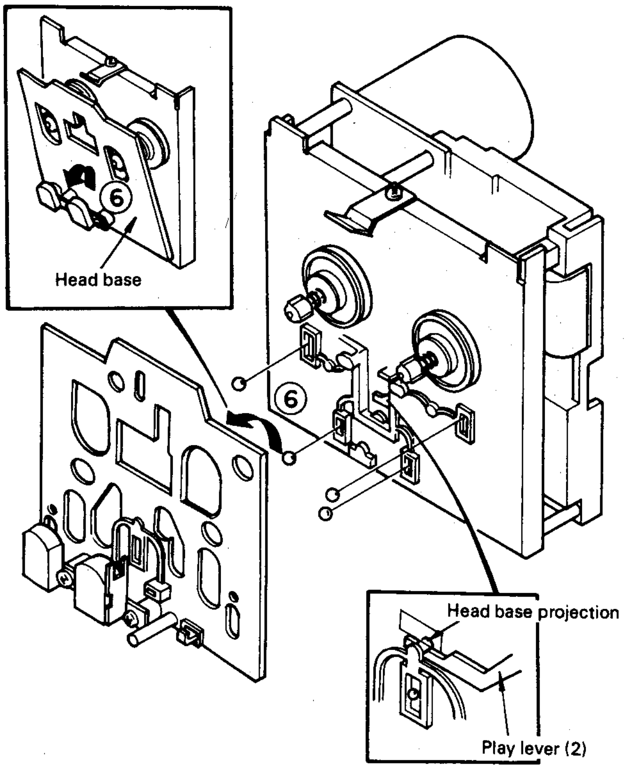
DISASSEMBLY FOR REPAIR

Head base removal

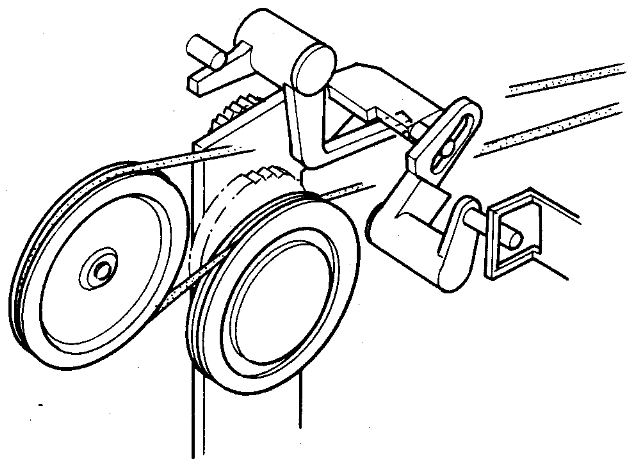

Stopper spring
⑤
Stopper (B)
③
④
Head base stopper plate
②
①
Pinch roller spring
Pinch roller

① Remove the pinch roller.
② Remove the pinch roller spring.
③ Remove stopper (B).
④ Remove the head base stopper plate.
⑤ Remove the stopper spring.
⑥ Remove the head base.

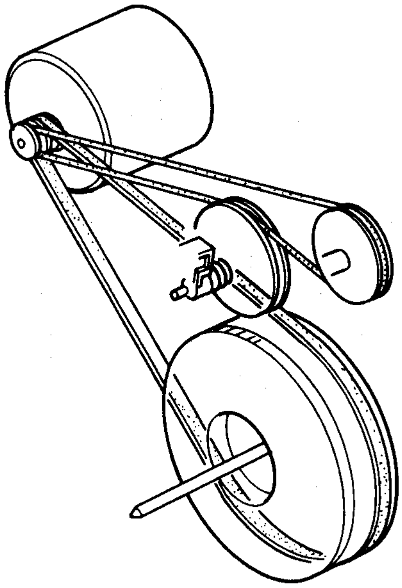
Note: Ensure that relative positioning of the head base projection and play lever (2) is correct when installing the head base.


⑥
Head base
⑥
Head base projection
Play lever (2)

Relative positioning of levers



Belt routing



CHECKING PROCEDURES

Procedures for Checking the Display Section

a) Fluorescent Display Tubes
All applicable display tube segments should light when "H" (+5V) is applied to the various segment inputs (connector 32) and the various digit inputs.

b) Tuned LED, Stereo LED, Signal LED
Light when all input terminals (connector 33) are set to "L" (0V).

c) DOLBY LED
Lights when the DOLBY input terminal (connector 8) is set to "L" (0V).

d) DPSS LED, POSITION LED
All LEDs should light when +5V is applied to all input terminals (connectors 6, 7, and 8) via a few kilohms resistor.

Procedures for Checking the Logic Board (X05-2060-10) (D/7)

Remove the display board and the SYNTHE board from the main unit. The logic board can then be checked from the back by removing the screws holding the logic board and removing the shield board.

Procedures for Checking the Synthesizer Section

1 Remove the DISPLAY board (X05-2060-10) (C/7) and the SYNTHE board (X05-2060-10) (B/7) from the main unit.

2 Remove the SYNTHE board from the molded display section, remove the shield case, then reattach the board to the molded display section.

Connect connectors 37b (B−, GND) and 33 (SYNTHE B, GND) to check operation. It is not necessary to connect connector 35 (for back up power supply). Further, connectors 31 and 32 do not need to be connected for SYNTHE operation, since they are used for the fluorescent display.

CASSETTE DECK MECHANISM OPERATION

Principle of Operation

Power from the motor selectively moves the FF lever and the REW lever, causing the head base and reel disk to operate according to the combinations in which the levers are raised or lowered.

Operation of both levers is accomplished by driving their corresponding solenoids.

1 Head base operation

All operation stops when both levers are lowered. In order to move from this state to one of the constant speed states (PLAY or REC), the two solenoids are activated simultaneously to raise the two levers. This cause the head base to move to the constant speed position. When the head base is to be returned from this state to the STOP position, the two solenoids are activated momentarily so that both levers are lowered together.

2 Take-up reel operation (FF)

The take-up reel rotates when only the FF lever is raised. To return from this state to the STOP position, the FF solenoid is driven so that the FF lever is lowered.

3 Supply reel operation

The supply reel rotates when only the REW lever is raised. To return from this state to the STOP position, the REW solenoid is driven so that the REW lever is lowered.

4 Movement to the sensor position

When the constant speed state is entered by raising the FF and REW levers simultaneously, after which one of the two levers is lowered, the head base drops to the sensor position and the reel disk rotates in either the fast forward or the rewind direction.

Basic Operations

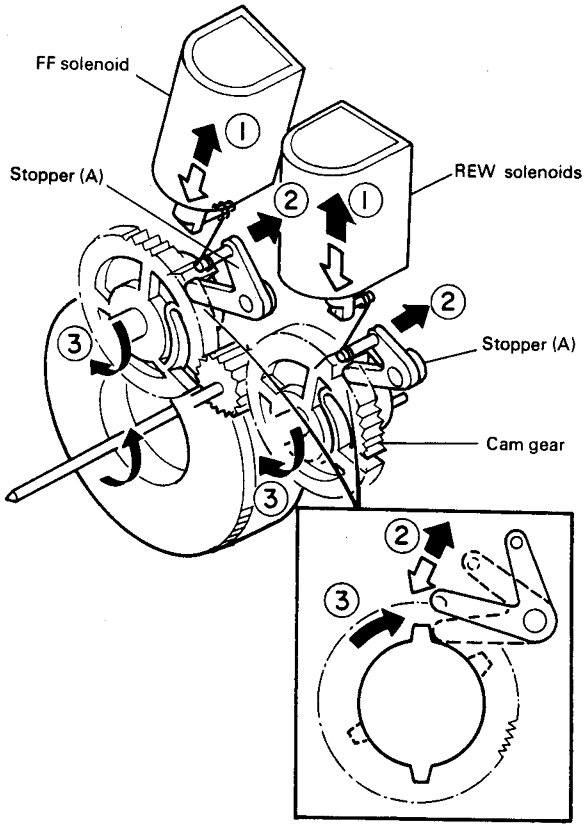
Six types of basic operations can be performed according to the principles of operation described in paragraph 1.

1 STOP

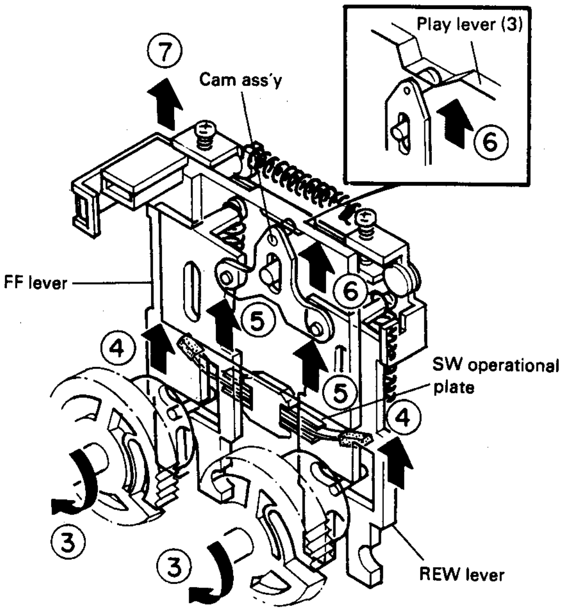
The STOP state is entered and no operations take place when both the FF and REW levers are lowered.

2 PLAY

In this state, both the FF and REW levers are raised and the head base is in the constant speed position.

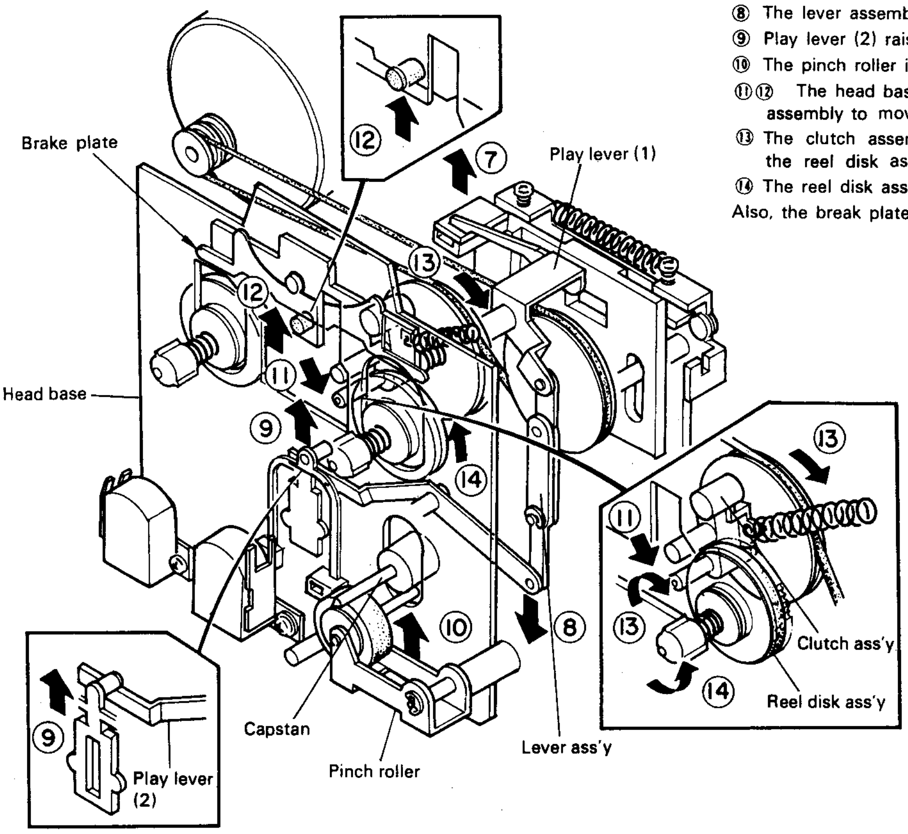


① When the PLAY key is pressed, the microprocessor momentarily activates the FF and REW solenoids.
② Stoppers (A) are pulled.
③ The cam gears rotate in the direction indicated by the arrow.



④ The projections on the cam gears raise the FF and REW levers.
⑤ The cam assembly is raised.
⑥ Play lever (3) is raised.
Also, the SW operational plate turns on the FF and REW switches, providing information to the microprocessor.

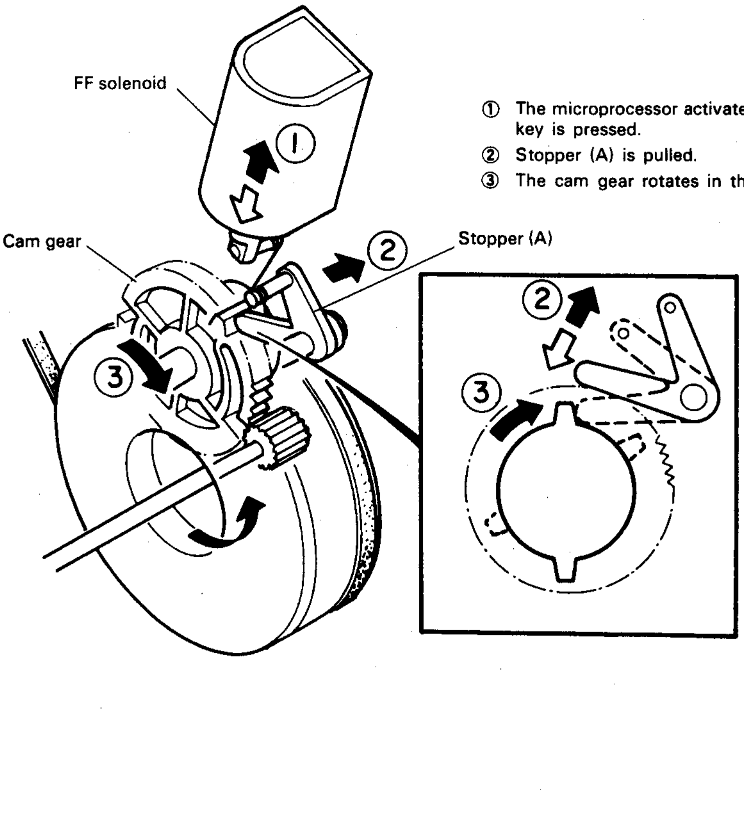
CASSETTE DECK MECHANISM OPERATION


Brake plate
Head base
Play lever (1)
⑦
⑫
⑬
⑪
⑨
⑭
⑩
⑧
Play lever (2)
Capstan
Pinch roller
Lever ass'y
Clutch ass'y
Reel disk ass'y

⑦ Play lever (1) is raised.
⑧ The lever assembly is lowered.
⑨ Play lever (2) raises the projection on the head base.
⑩ The pinch roller is pressed against the capstan.
⑪⑫ The head base causes the projection on the clutch assembly to move to the right when it is raised.
⑬ The clutch assembly spindle comes in contact with the reel disk assembly.
⑭ The reel disk assembly begins rotating.
Also, the break plate is raised when the head base rises.

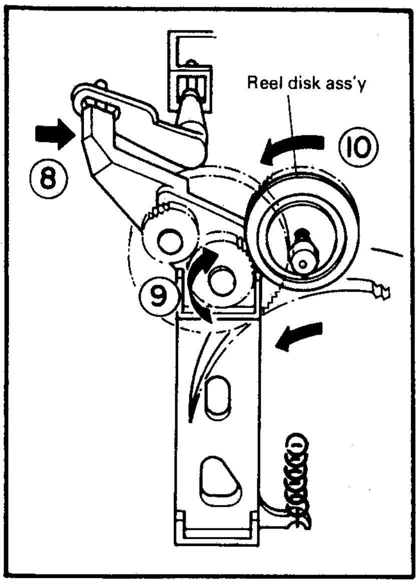
3 FF

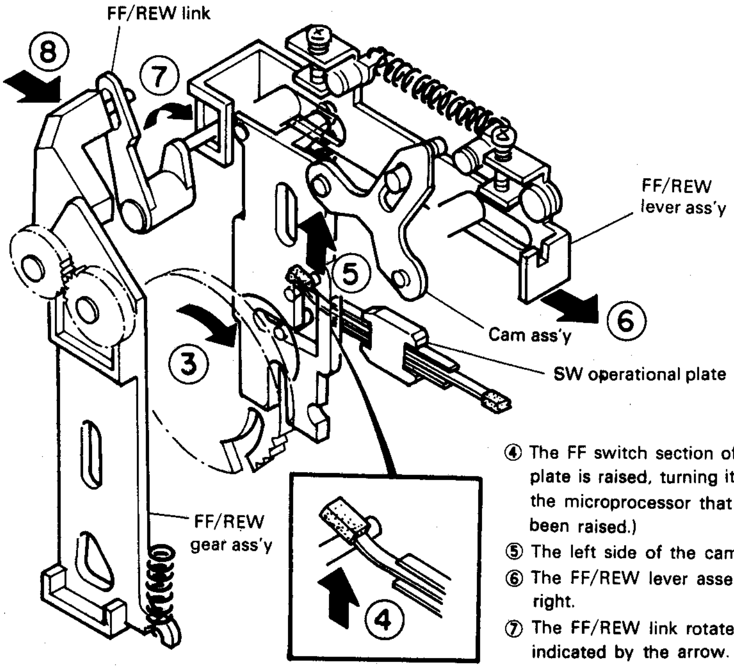
This state is entered when the FF lever is raised while in the STOP state, causing the take-up reel to rotate at high speed.


FF solenoid
①
Cam gear
②
Stopper (A)
③

① The microprocessor activates the FF solenoid momentarily when the FF key is pressed.
② Stopper (A) is pulled.
③ The cam gear rotates in the direction indicated by the arrow.

CASSETTE DECK MECHANISM OPERATION





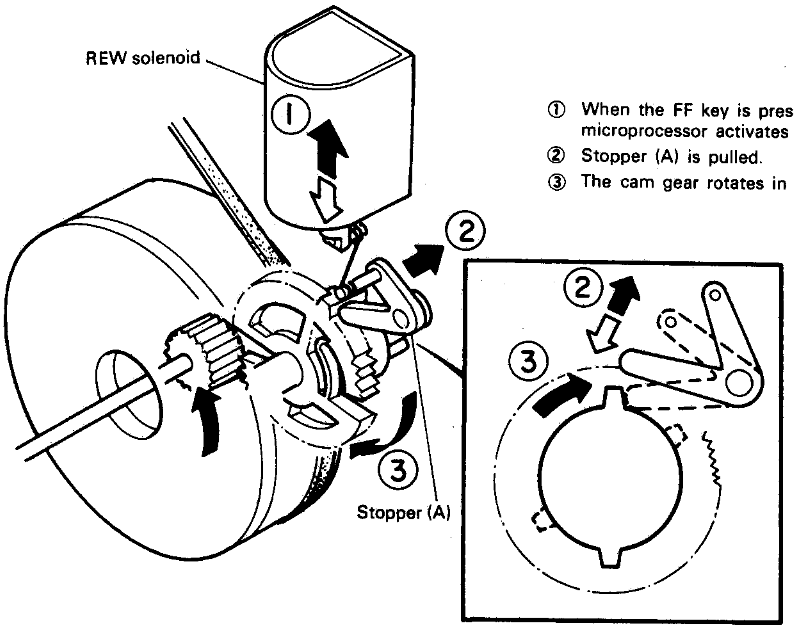
④ The FF switch section of the SW operational plate is raised, turning it ON. (This informs the microprocessor that the FF lever has been raised.)
⑤ The left side of the cam assembly is raised.
⑥ The FF/REW lever assembly moves to the right.
⑦ The FF/REW link rotates in the direction indicated by the arrow.
⑧ The FF/REW gear assembly moves to the right.
⑨ ⑩ The take-up side of the reel disk assembly meshes with the FF/REW gear assembly and the reel disk assembly rotates.

4 REWIND

This state is entered when the REW lever is raised while in the STOP state, causing the supply reel to rotate at high speed. REWIND operation is the same as FF operation, except that the parts involved are different.

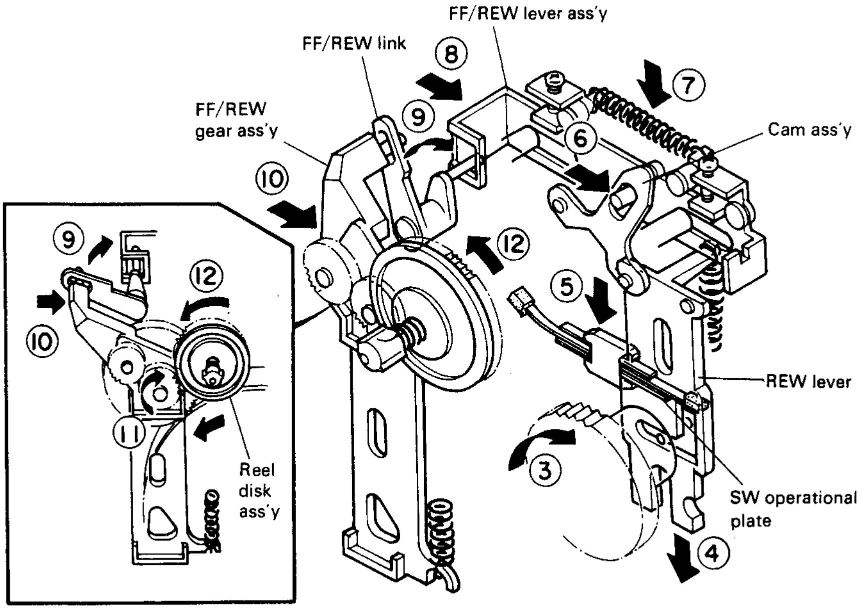
5 CUE

This state is entered when the REW lever is lowered while in the PLAY state, causing the take-up reel to rotate at high speed. At this time, the head base is lowered far enough for the pinch roller to break contact with the capstan (but the head remains in light contact with the tape).

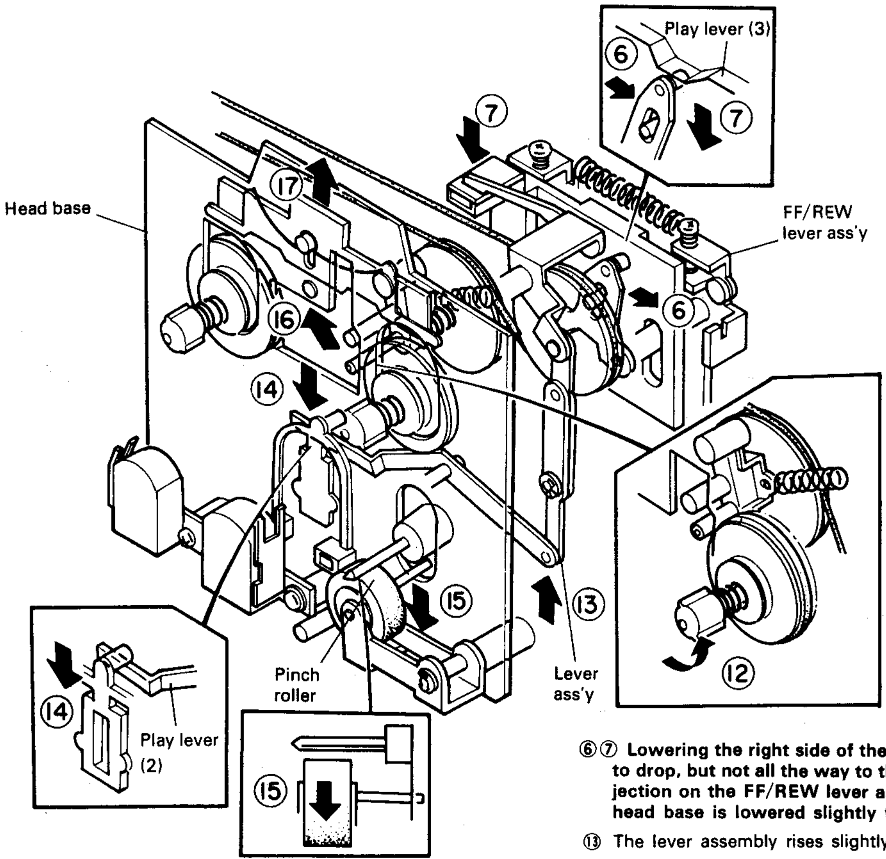


① When the FF key is pressed while the unit is in the PLAY mode, the microprocessor activates the REW solenoid momentarily.
② Stopper (A) is pulled.
③ The cam gear rotates in the direction indicated by the arrow.

CASSETTE DECK MECHANISM OPERATION


FF/REW lever ass'y
FF/REW link
FF/REW gear ass'y
Cam ass'y
REW lever
SW operational plate
Reel disk ass'y
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫

- ④ The REW lever drops.
- ⑤ The REW switch section of the SW operational plate is pressed, turning it OFF.
- ⑥ The right side of the cam assembly is lowered.
- ⑦⑧ The FF/REW lever assembly moves in the direction indicated by the arrow.
- ⑨ The FF/REW link rotates in the direction indicated by the arrow.
- ⑩ The FF/REW gear assembly moves to the right.
- ⑪⑫ The take-up side of the reel disk assembly meshes with the FF/REW gear assembly and the reel disk assembly rotates.


Play lever (3)
Head base
FF/REW lever ass'y
Pinch roller
Lever ass'y
Play lever (2)
⑥
⑦
⑫
⑬
⑭
⑮
⑯
⑰

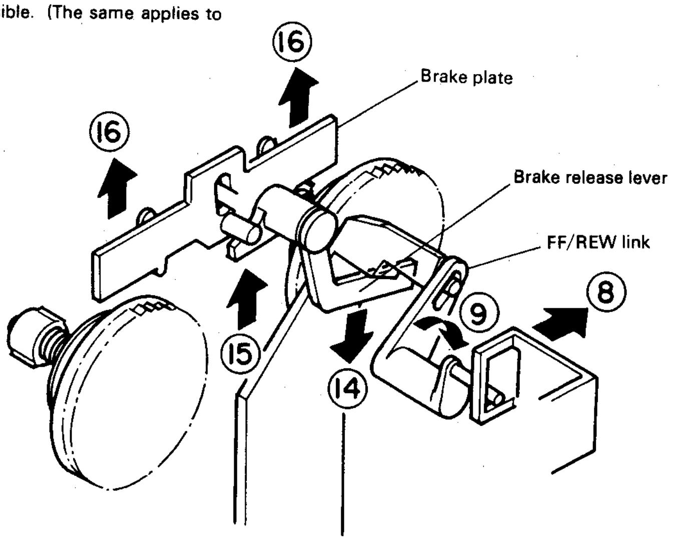
⑥⑦ Lowering the right side of the cam assembly causes play lever (3) to drop, but not all the way to the FF/REW position. Since the projection on the FF/REW lever assembly supports play lever (3), the head base is lowered slightly from its PLAY mode position.

- ⑬ The lever assembly rises slightly.
- ⑭ Play lever (2) drops slightly.
- ⑮ Since the head base drops slightly, the pinch roller drops slightly also.

CASSETTE DECK MECHANISM OPERATION

Brake Plate Operation

As was indicated in the explanation of CUE operation, the brake release lever drops and the brake plate is raised when the FF/REW link rotates. In other words, reel disk rotation becomes possible. (The same applies to CUE, FF, REWIND, and REVIEW.)



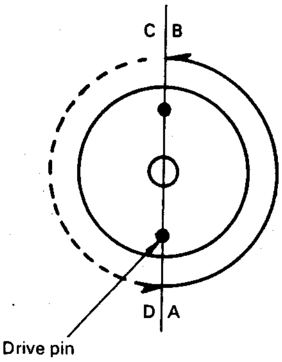
6 REVIEW

This state is entered when the FF lever is lowered while in the PLAY state, causing the supply reel to rotate at high speed. At this time, the head base is lowered far enough for the pinch roller to break contact with the capstan (but the head remains in light contact with the tape). REVIEW operation is the same as CUE operation, except that the parts involved are different.

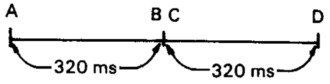
Control Method (Relationship between cam gear operation time and repeat inhibit time)

Since all operations are coupled to rotation of the cam gear, another operation cannot be initiated while the cam gear is rotating.

1 Cam gear operation time



Cam gear sequence diagram



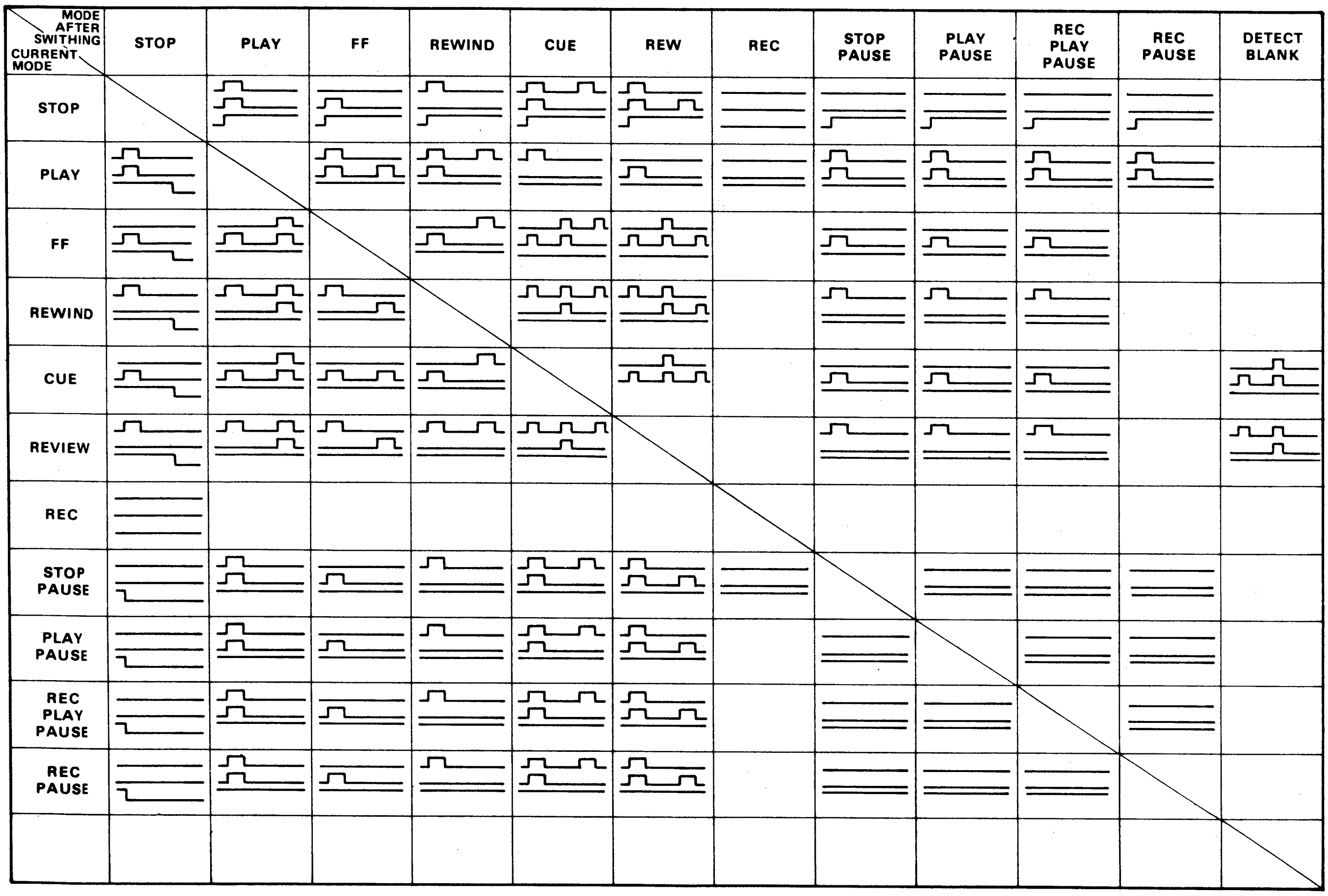
Cam gear operation time

One cam gear operation is completed each time the drive pin moves from A to B (or from C to D) as shown in the cam gear sequence diagram.

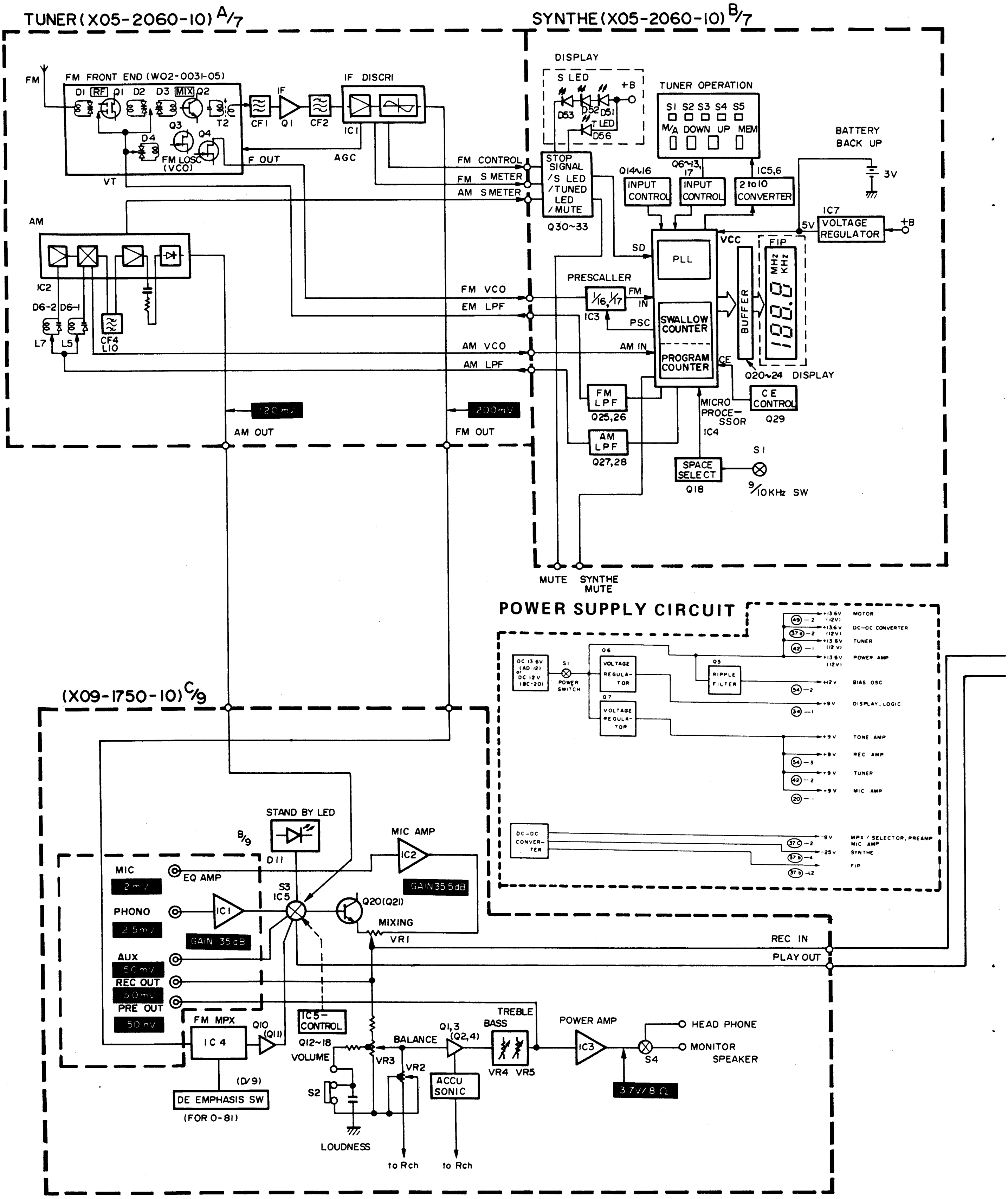
CASSETTE DECK MECHANISM OPERATION

SOLENOID SEQUENCE

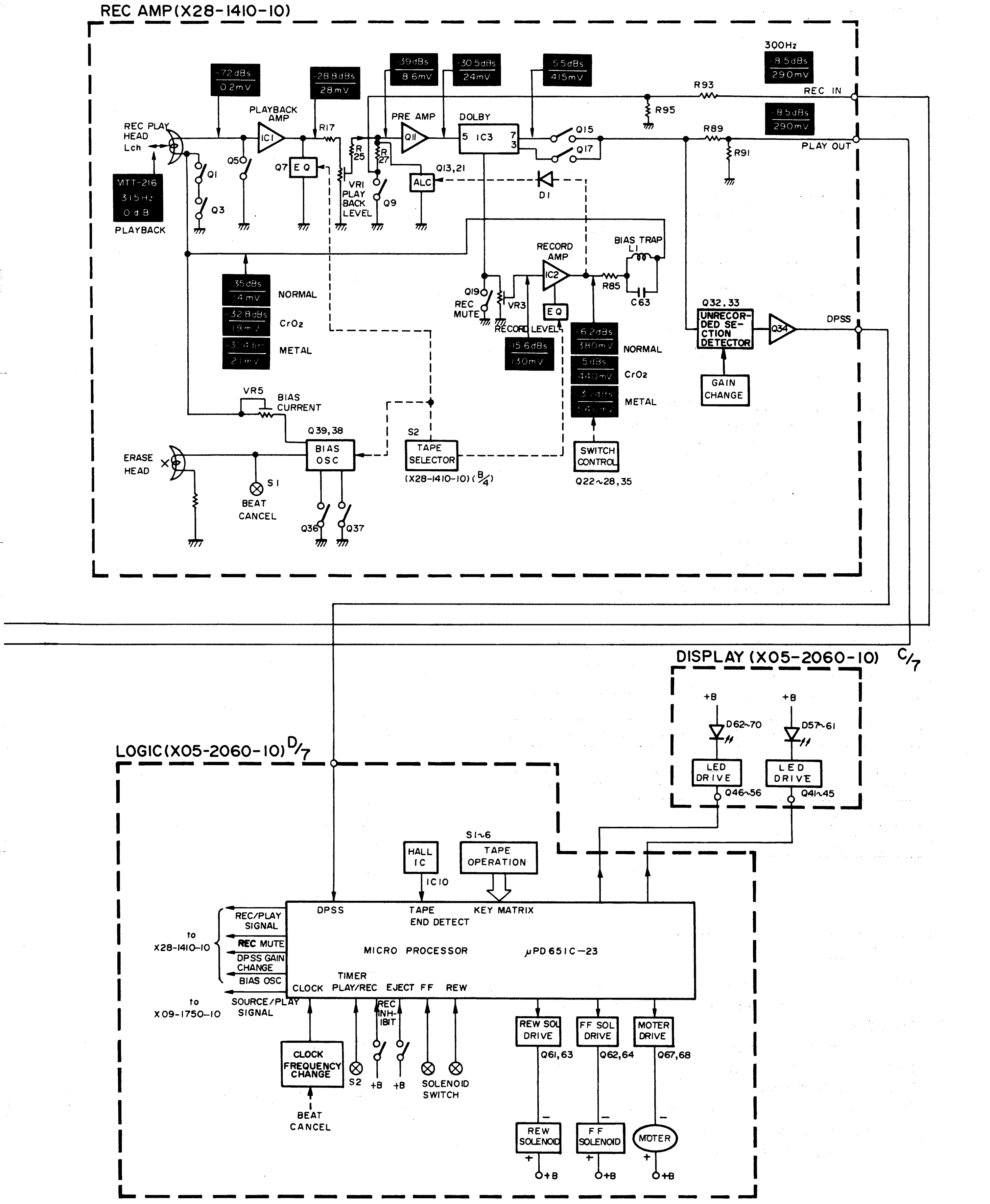
Top level............................ REW solenoid
Middle level........................ FF solenoid
Bottom level....................... Motor
⎍ .... KEY ON points are indicated by arrows.


MODE AFTER SWITHING
CURRENT MODE
STOP
PLAY
FF
REWIND
CUE
REW
REC
STOP PAUSE
PLAY PAUSE
REC PLAY PAUSE
REC PAUSE
DETECT BLANK
STOP
PLAY
FF
REWIND
CUE
REVIEW
REC
STOP PAUSE
PLAY PAUSE
REC PLAY PAUSE
REC PAUSE

BLOCK DIAGRAM


TUNER (X05-2060-10) A/7
FM
FM FRONT END (W02-0031-05)
D1 RF Q1 D2 D3 MIX Q2
Q3 Q4
T2
D4
FM LOSC (VCO)
VT
F OUT
CF1 IF Q1 CF2
IF DISCRI
IC1
AGC
FM CONTROL
FM S METER
AM S METER
AM
IC2
D6-2 D6-1
L7 L5
CF4 L10
FM VCO
EM LPF
AM VCO
AM LPF
120mV
200mV
AM OUT
FM OUT
SYNTHE (X05-2060-10) B/7
DISPLAY
S LED
+B
D53 D52 D51
T LED
D56
STOP SIGNAL /S LED /TUNED LED /MUTE
Q30~33
TUNER OPERATION
S1 S2 S3 S4 S5
M/A DOWN UP MEM
Q14~16
INPUT CONTROL
Q6~13, 17
INPUT CONTROL
IC5,6
2 to 10 CONVERTER
BATTERY BACK UP
3V
IC7
5V
VOLTAGE REGULATOR
+B
VCC
SD
PLL
FIP
MHz KHz
BUFFER
PRESCALLER
1/16, 1/17
FM IN
IC3
PSC
SWALLOW COUNTER
AM IN
PROGRAM COUNTER
CE
Q20~24 DISPLAY
FM LPF
Q25,26
AM LPF
Q27,28
MICRO PROCESSOR
IC4
CE CONTROL
Q29
SPACE SELECT
Q18
S1
9/10KHz SW
MUTE
SYNTHE MUTE
POWER SUPPLY CIRCUIT
DC 13.6V (AD-12) or DC 12V (BC-20)
S1
POWER SWITCH
Q6
VOLTAGE REGULATOR
Q7
VOLTAGE REGULATOR
Q5
RIPPLE FILTER
+13.6V (12V) MOTOR
49 -2
+13.6V (12V) DC-DC CONVERTER
37a -2
+13.6V (12V) TUNER
42 -1
+13.6V (12V) POWER AMP
+12V BIAS OSC
54 -2
+9V DISPLAY, LOGIC
34 -1
+9V TONE AMP
+9V REC AMP
54 -3
+9V TUNER
42 -2
+9V MIC AMP
20 -1
DC-DC CONVERTER
-9V MPX / SELECTOR, PREAMP MIC AMP
37c -2
-25V SYNTHE
37b -4
FIP
37b -12
(X09-1750-10) C/9
B/9
STAND BY LED
D11
MIC AMP
IC2
GAIN 35.5dB
MIC
2mV
EQ AMP
PHONO
2.5mV
IC1
GAIN 35dB
S3
IC5
Q20(Q21)
MIXING
VR1
REC IN
PLAY OUT
AUX
50mV
REC OUT
50mV
PRE OUT
50mV
FM MPX
IC4
Q10 (Q11)
IC5-CONTROL
Q12~18
VOLUME
(D/9)
DE EMPHASIS SW
(FOR 0-81)
S2
LOUDNESS
VR3
BALANCE
VR2
to Rch
Q1,3 (Q2,4)
ACCU SONIC
to Rch
TREBLE
BASS
VR4 VR5
POWER AMP
IC3
3.7V/8Ω
S4
HEAD PHONE
MONITOR SPEAKER

BLOCK DIAGRAM


REC AMP(X28-1410-10)
REC PLAY HEAD Lch
MTT-216
315Hz
0dB
PLAYBACK
-72dBs
0.2mV
PLAYBACK AMP
IC1
Q1
Q3
Q5
Q7
EQ
-28.8dBs
28mV
R17
R25
R27
VR1 PLAY BACK LEVEL
Q9
-39dBs
8.6mV
PRE AMP
Q11
-30.5dBs
24mV
DOLBY
5 IC3 7 3
ALC
Q13,21
-5.5dBs
415mV
Q15
Q17
D1
300Hz
-8.5dBs
290mV
R93
REC IN
R95
R89
R91
-8.5dBs
290mV
PLAY OUT
-35dBs
14mV
NORMAL
-32.8dBs
18mV
CrO2
METAL
21mV
RECORD AMP
IC2
BIAS TRAP
L1
R85
C63
Q19
REC MUTE
VR3
RECORD LEVEL
EQ
-15.6dBs
130mV
-6.2dBs
380mV
NORMAL
5dBs
440mV
CrO2
METAL
Q32,33
UNRECORDED SECTION DETECTOR
Q34
DPSS
GAIN CHANGE
VR5
BIAS CURRENT
Q39,38
BIAS OSC
ERASE HEAD
S1
BEAT CANCEL
Q36
Q37
S2
TAPE SELECTOR
(X28-1410-10)(B/4)
SWITCH CONTROL
Q22~28,35
DISPLAY (X05-2060-10)
C/7
+B
D62~70
LED DRIVE
Q46~56
+B
D57~61
LED DRIVE
Q41~45
LOGIC(X05-2060-10) D/7
HALL IC
IC10
S1~6
TAPE OPERATION
DPSS
TAPE END DETECT
KEY MATRIX
MICRO PROCESSOR
μPD651C-23
REC/PLAY SIGNAL
REC MUTE
DPSS GAIN CHANGE
BIAS OSC
to X28-1410-10
SOURCE/PLAY SIGNAL
to X09-1750-10
CLOCK
TIMER PLAY/REC
EJECT
FF
REW
REC INHIBIT
CLOCK FREQUENCY CHANGE
BEAT CANCEL
S2
+B
+B
SOLENOID SWITCH
REW SOL DRIVE
Q61,63
FF SOL DRIVE
Q62,64
MOTER DRIVE
Q67,68
REW SOLENOID
FF SOLENOID
MOTER
+B
+B
+B

CIRCUIT DESCRIPTION

I. FREQUENCY SYNTHESIZER

The block diagram of a frequency synthesized tuner is shown in Fig. 1. The local oscillator frequency is locked to the reference frequency (which is usually generated with a crystal controlled oscillator) by means of the phase locked loop (PLL).

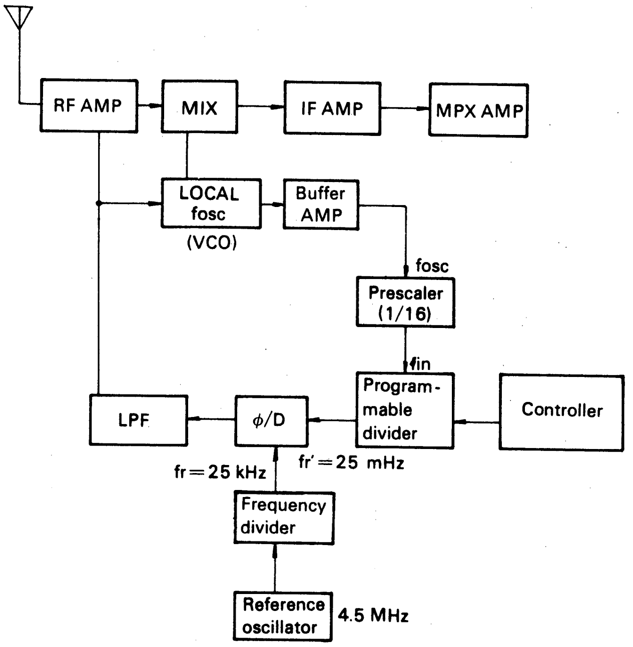
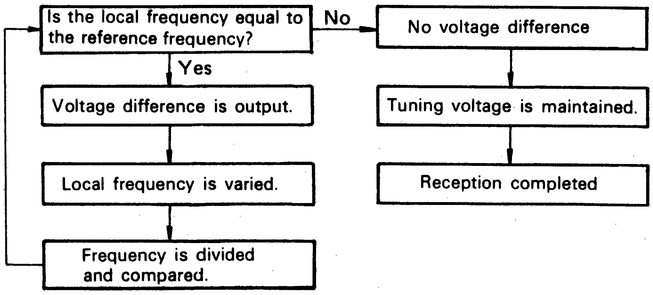

RF AMP
MIX
IF AMP
MPX AMP
LOCAL
fosc
(VCO)
Buffer
AMP
fosc
Prescaler
(1/16)
fin
Program-
mable
divider
Controller
LPF
φ/D
fr=25 kHz
fr'=25 mHz
Frequency
divider
Reference
oscillator
4.5 MHz

Fig. 1 Frequency synthesizer (fixed frequency divider type)

Frequency comparison is performed by the PLL as follows.


Is the local frequency equal to the reference frequency?
No
No voltage difference
Yes
Voltage difference is output.
Tuning voltage is maintained.
Local frequency is varied.
Reception completed
Frequency is divided and compared.

The blocks shown in Fig. 1 are explained below.

1. **Buffer AMP**
   This block is used to buffer the local oscillator and to obtain a voltage level sufficient to drive the prescaler.
2. **Prescaler**
   This block divides the local frequency, since it is too high for the programmable divider to handle directly.
3. **Programmable divider**
   This block is the core of the synthesized tuner. It divides the input frequency (prescaler output) to 25 kHz according to the division ratio given by the controller.

   Example:
   To receive a broadcast on 101.3 MHz
   $f = 101.3$ MHz
   $f_{osc} = 101.3 + 10.7 = 112$ MHz
   fosc is divided by 16 by the prescaler.
   $f_{in} = 112 \div 16 = 7$ (MHz)
   The reference frequency is 25 kHz.
   $f_r = 25$ kHz
   To divide 7 MHz into 25 kHz, f_{in} must be divided by 280. That is, the division ratio is 280 for receiving 101.3 MHz.
4. **φ/D (phase detector)**
   This block compares the phase of the divided signal with that of the 25 kHz reference signal and outputs voltage which is proportional to the difference.
5. **Frequency divider**
   This block divides the reference oscillator signal to 25 kHz.
6. **Reference oscillator**
   This block uses a crystal to generate a 4.5 MHz reference signal.
7. **LPF**
   This block filters the phase detector output signal to obtain a DC signal.
8. **Local oscillator**
   This block generates a frequency which varies according to the DC signal output by the LPF.
9. **Controller**
   This block determines the division ratio for the programmable divider.

PLL Operation

The phase detector (φ/D in Fig. 1) compares the phase of input signals fr and fr'. When there is a difference between the two, a difference signal is output to LPF, where it is converted to a DC signal. This DC signal is applied to the VCO (local oscillator) so that the frequency it generates is varied to reduce the difference between fr and fr'. Thus, a very accurate and stable local frequency is obtained.

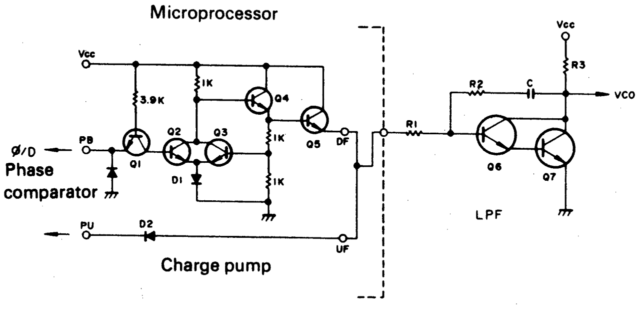

Microprocessor
Vcc
3.9K
1K
Q4
Q2
Q3
Q5
DF
φ/D
PB
Phase
comparator
Q1
D1
1K
1K
PU
D2
UF
Charge pump
Vcc
R3
R2
C
VCO
R1
Q6
Q7
LPF

Fig. 2 Charge pump and LPF

CIRCUIT DESCRIPTION

In practice, a charge pump circuit is placed between ϕ/D and LPF. Figure 2 shows an example of a charge pump circuit.

Assume that fr' leads fr in phase. Low and high level signals are applied to terminals PD and PU, respectively. The base current of Q1 flows since the emitter level is low. Q2 is reverse-biased, so it is OFF. Q3 and D1 conduct, so the base voltage of Q3 is about 1.5V. The level at the emitter of Q4 (or at the base of Q5) is about 3V because the level at the base of Q3 is half of the level at the emitter of Q4. At this time, the level at the emitter of Q5 is about 2.25V (3V-V_{BE}). This level is lower than the level at terminal PU (2.4V or higher in the case of TTL), so D2 is reverse-biased. Q6 and Q7 are ON since the Q5 emitter level is 2.25V. Therefore, the collector level of Q7 decreases.↗ ↗With the VCO, the frequency generated is generally in proportion to the input voltage as shown in Fig. 3. Therefore, the VCO frequency falls when the collector level of Q7 drops. Thus, fr' approaches fr.

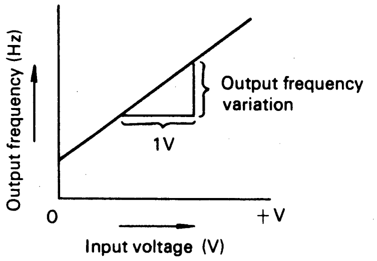


Fig. 3 Input voltage VS. output frequency of the VCO

On the other hand, assume that fr' lags fr in phase. In this case, high and low level signals are applied to terminals PD and PU, respectively. D2 is forward-biased, so the level at terminal UF is about 0.65V. Current flows through the base and collector of Q1 to the base of Q2. Q2 conducts, so Q4 cannot drive Q5. Since Q5 is OFF, the level at terminal UF is low and no base current flows into Q6. Therefore, the collector level of Q7 increases. As described above, the charge pump reverses the pulse signals generated according to the phase difference between fr and fr' and converts them to an appropriate level for application to LPF. When there is no phase difference between fr and fr', high level signals are applied to terminals PD and PU, so that terminals DF and UF are floating. Therefore, the VCO oscillates, according to the voltage charged in the capacitor of LPF.

Pulse swallow system

In the PLL system, it is desirable that the reference frequency be set as high as possible to improve the C/N (carrier/noise) ratio. With the fixed division ratio prescaler, however, the reference frequency cannot be set very high when the division ratio is large.↗ ↗The pulse swallow system solves this problem by using two frequency division ratios. The pulse swallow system allows the frequency input to the programmable divider to be lower and allows the VCO frequency to be changed in relation to the reference frequency by changing the division ratio of the programmable divider by one.

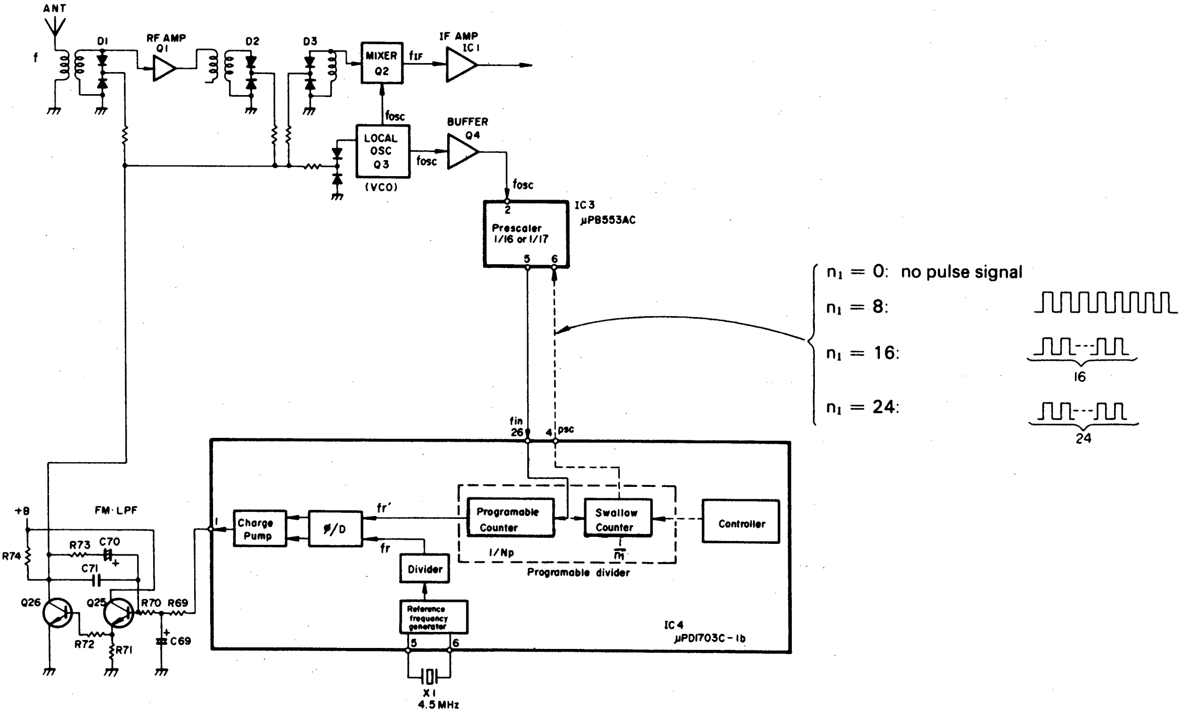

ANT
f
D1
RF AMP Q1
D2
D3
MIXER Q2
fIF
IF AMP IC1
fosc
LOCAL OSC Q3
(VCO)
BUFFER Q4
fosc
fosc
2
Prescaler 1/16 or 1/17
IC3 μPB553AC
5
6
n1 = 0: no pulse signal
n1 = 8:
n1 = 16:
16
n1 = 24:
24
fin 26
4 psc
+B
FM·LPF
R74
R73
C70
C71
Q26
Q25
R70
R69
R72
R71
C69
1
Charge Pump
ϕ/D
fr'
fr
Programable Counter
Swallow Counter
Controller
1/Np
n1
Programable divider
Divider
Reference frequency generator
5
6
IC4 μPD1703C-1b
X1 4.5MHz

Fig. 4 DC-20X frequency synthesizer (pulse swallow system)

CIRCUIT DESCRIPTION

Tuning with the pulse swallow system

Table 1 Frequency table (U.S. band)

f (MHz)	*fosc* (MHz)	*fin* (MHz)	Total division ratio (N) : Decimal	Total division ratio (N) : Hexadecimal	n_1	NP
101.3	112.0	7.0	4480_{10}	$1180_{16}(=\overbrace{1180}^{a}{}_{16}+\overbrace{0}^{b})$	0	280
101.5	112.2	7.0	4488_{10}	$1188_{16}(=1180_{16}+8_{10})$	8_{10}	280
101.7	112.4	7.0	4496_{10}	$1190_{16}(=1180_{16}+16_{10})$	16_{10}	280
101.9	112.6	7.0	4504_{16}	$1198_{16}(=1180_{16}+24_{10})$	24_{10}	280
102.1	112.8	7.05	4512_{10}	$11A0_{16}(=11A0_{16}+0)$	0	282
102.3	113.0	7.05	4520_{10}	$11A8_{16}(=11A0_{16}+8_{10})$	8_{10}	282
102.5	113.2	7.05	4528_{10}	$11B0_{16}(=11A0_{16}+16_{10})$	16_{10}	282

f: Receiving frequency
fosc: Local oscillator frequency
fin: Frequency input to μPD1703C-016
N: Total division ratio = *fosc*÷*fr* (=25 kHz)
n_1: Value of b in the total division ratio (division ratio of the swallow counter)
Np: Division ratio of the program counter (the value of **a** in the total division ratio divided by 16)

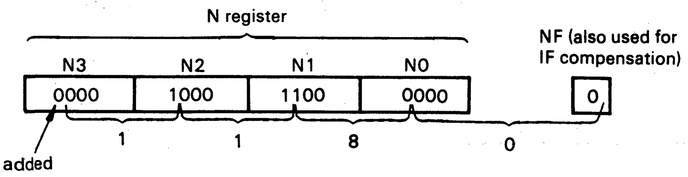
Assume that 101.3 MHz is received through preset tuning. In the U.S.A., local frequency *fosc* is 10.7 MHz higher than the receiving frequency.

$$\begin{aligned} fosc &= 101.3 + 10.7 \text{ MHz} \\ &= 112 \text{ MHz} \end{aligned}$$

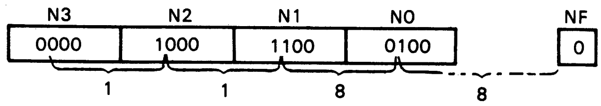
When the reference frequency is 25 kHz, the total division ratio is

$$\begin{aligned} N &= fosc \div f\,r \\ &= 112 \div 0.025 \\ &= 4480_{10} \text{ (decimal)} \\ &= 1180_{16} \text{ (hexadecimal)} \\ &= 0001000110000000_2 \text{ (binary)} \end{aligned}$$

Reference:
Total division ratio N is set in the N and NF registers of the microprocessor in binary.



As shown above, the least significant bit is set in the NF register and the most significant bit is set to 0. With this method, the contents of the N register are equal to the division ratio when *fr* = 50 kHz. That is, the VCO frequency can be varied by 50 kHz by changing the contents of the N register by one. For use in the U.S.A. (since the channel space is 200 kHz), the VCO frequency can be varied by 200 kHz by changing the contents of the N register by four. For example, by adding four to the value shown in the previous figure,



$$\begin{aligned} N &= 1188_{16} \\ &= 4488_{10} \end{aligned}$$

This value is equal to the total division ratio (4488_{10}) when *fosc* = 112.2 MHz.

When a prescaler with a fixed division ratio is used, it is difficult to set the reference frequency to 25 kHz, so it may be necessary to set it to a lower value. As described previously, the C/N ratio is degraded as the reference frequency is reduced. This problem is solved by using a prescaler with two division ratios.

In the DC-20X, μPB553AC allows the division ratio to be set to 1/16, and 1/17 is used for the prescaler.

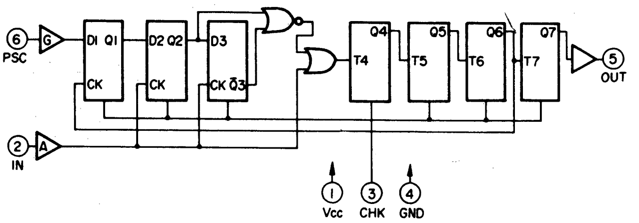
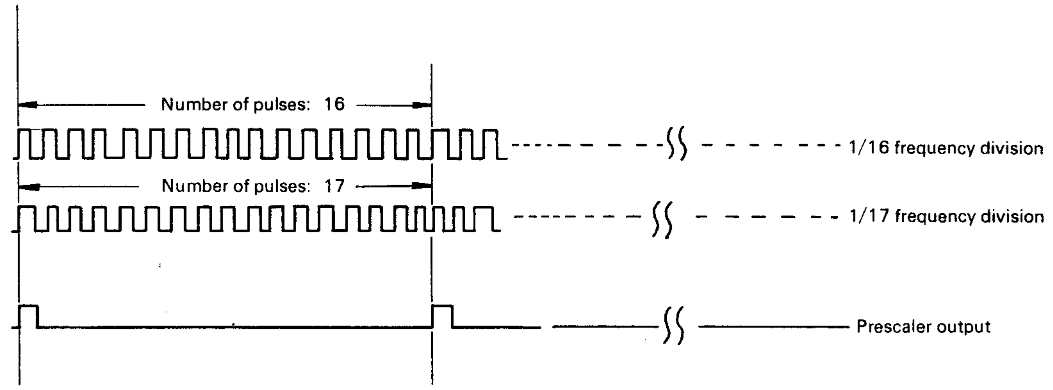


Fig. 5 μPB553AC block diagram

CIRCUIT DESCRIPTION

μPB553AC Operation



1 When no pulse signal is applied to the PSC terminal, the prescaler outputs 1 pulse for every 16 pulses input to the IN terminal.
2 When a pulse applied to the PSC terminal rises, one of the pulses input to the IN terminal is ignored; that is, the prescaler outputs 1 pulse for every 17 pulses input to the IN terminal.

When f = 101.3 MHz ($f$osc = 112 MHz), the number of pulses applied to the input terminal of the prescaler is 112,000,000 per second. At this time, the total division ratio is 4480, which is divisible by 16.

$4480 \div 16 = 280$

In this case, the prescaler can operate with a division ratio of 1/16 so that no pulse signal is applied to the PSC terminal.

The number of pulses is decreased to 7,000,000 by the prescaler, then decreased to 25,000 (7000000 ÷ 280) by the programmable counter. This means that the frequency of the programmable counter output signal is 25 kHz; that is, $f$osc is divided to 25 kHz.

Consider the case in which f = 101.5 MHz ($f$osc = 112.2 MHz). Here, the prescaler plays an important role. The total division ratio is not divisible by 16.

$4488 \div 16 = 280$ 8

At this time, the programmable counter is set to 280 and the swallow counter is set to 8.

One pulse swallow operation is completed within 1/25000 seconds. Therefore, making the time unit 1/25000 seconds allows the operation to be understood more easily.

The number of pulses of the 112.2 MHz signal is 4488 per time unit (1/25000 seconds). 8 pulses are applied to the PSC terminal during each time unit. This means that the prescaler outputs one pulse for every 17 input pulses until 8 pulses are output, then outputs one pulse for every 16 input pulses for the period during which (280 ∼ 8) pulses are output. Thus, the prescaler outputs 280 pulses for the period of the time unit (1/25000 seconds).

$17 \times 8 + 16 \times (280-8) = 4488$
(equal to total division ratio)

This number of pulses (280) is equal to that in the case in which fosc = 112 MHz. 280 pulses in 1/25000 seconds means 7,000,000 pulses per second; that is, the frequency is 7 MHz.

As is described above and shown in Table 1, fin is identical for 4 adjacent receiving frequencies (or channels).

After one pulse swallow operation has been completed, signal fr, is sent to the ϕ/D, and the swallow counter and programmable counter are reset to repeat the above operation.

Reference

In general, total division ratio N is represented by the sum of nl (for 1/17 division) and n2 (for 1/16 division).

$N = 17 \cdot n1 + 16 \cdot n2$

(This is the basic principle of the pulse swallow system). Since the program counter division Np = n1 + n2,

$$\begin{aligned} N &= 17 \cdot n1 + 16 \cdot (Np - n1) \\ &= n1 + 16Np \end{aligned}$$

This means that the quotient of N divided by 16 (Np) is set to the programmable counter and the remainder (nl) is set to the swallow counter.

CIRCUIT DESCRIPTION

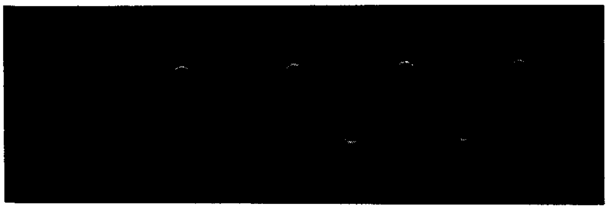
II. SYNTHESIZER TUNER CHECKING

The fundamental check points of the synthesizer tuner are as follows.

1 The microprocessor power supply voltage

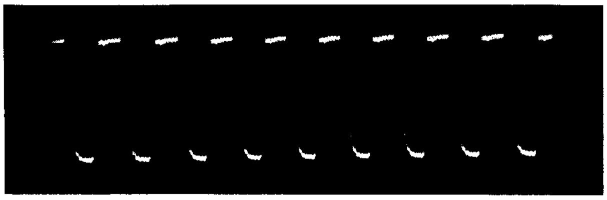
2 The microprocessor clock system

IC4-5 2V/cm, 10μs/cm, DC

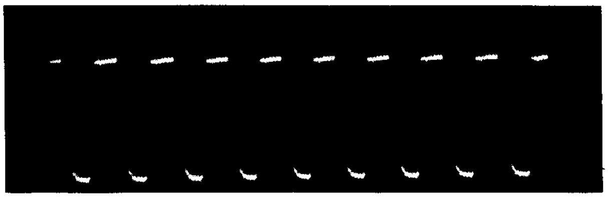


3 *f*in: Manually set the display frequency as shown in Table 1 and confirm that *f*in (at pin 26 of the microprocessor IC) is equal to the value shown in the table.

IC4-2 6 0.5V/cm, 0.2μs/cm, AC



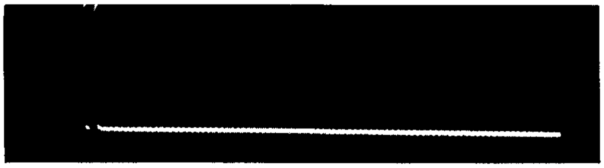
When a pulse is not applied to terminal PSC.



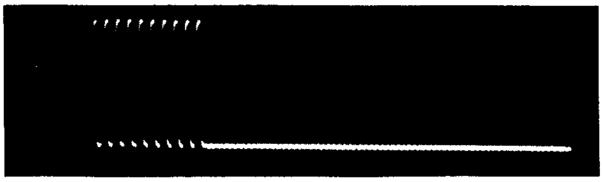
When a pulse is applied to terminal PSC.

4 PSC terminal: In the U.S.A., the number of pulses at the PSC terminal changes in the sequence 0, 8, 16, 24 (200 kHz steps); in Europe, the sequence is 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 (50 kHz steps) when the ceramic filters of red color are used. When the ceramic filters other than red color are used, the number of pulses at the PSC terminal is different from the case of the ceramic filter of red color.

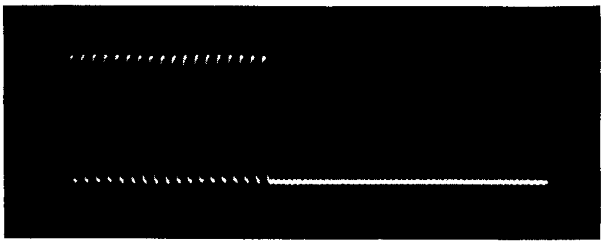
IC4-4 2V/cm, 2μs/cm, DC
When the ceramic filters of black color are used. (center frequency: 10.650 MHz)



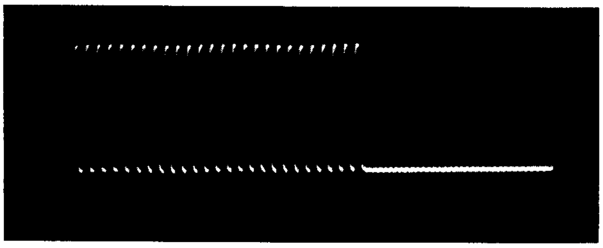
f=101.3 MHz



f=101.5 MHz



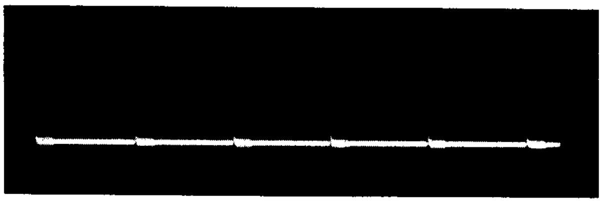
f=101.7 MHz



f=101.9 MHz

5 Confirm that the (charge pump) waveform at pin 1 of the microprocessor is as shown in the photograph.

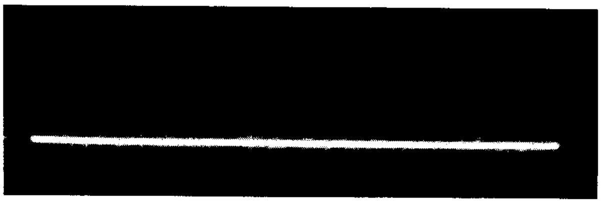
IC4-1 1V/cm, 20μs/cm, the white line indicates 1.2V.



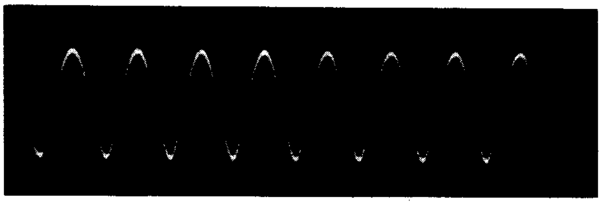
6 Confirm that the collector voltage of Q26 varies continuously from about 1V to about 8V as the frequency varies from low to high.

For AM reception, the prescaler is not used and the local frequency is divided directly by the programmable divider.

IC4-2 1V/cm, 20μs/cm, the white line indicates 1.2V.



IC4-28 0.5V/cm, 0.5μs/cm, AC



CIRCUIT DESCRIPTION

III. FREQUENCY SYNTHESIZER USED IN THE DC-20X

The basic block diagram of the frequency synthesizer used in the DC-20X is almost the same as that shown in Figure 1; the prescaler, however, uses the pulse swallow system. Microprocessor μPD1703C-016 for the PLL synthesizer and prescaler μPB553AC are used to form the LW/MW/FM digital synthesizer tuner.

μPD1703C-016

Features

- Capable of directly driving the segments of the FIP (fluorescent tube)
- Built-in PLL, swallow counter and controller
- Easily preset memory back-up (less than 10 μA)
- Capable of displaying the preset memory channel address (by LED)
- High FM reference frequency (25 kHz) because of the pulse swallow system.
- Can be set for frequency ranges and channel spaces (LW/MW and FM) used in the USA, Europe or Japan
- Capable of storing 7 frequencies for FM and 7 frequencies for LW/MW
- Either the momentary switch or the alternate switch can be used as preset keys and band selector keys (MW and FM).
- Last channel memory for each band
- Capable of AUTO and MANUAL UP/DOWN tuning (sawtooth wave tuning)
- Off setable FM IF (4 frequencies in 25 kHz intervals)
- Built-in frequency presetting function for adjustment during mass production
- 4-1/2 digit display for the European FM band (4 digit display for other bands)
- Small 28-pin slim DIP
- Single power supply of 5V ± 10%

Outline of Functions

Receiving frequency, reference frequency, channel space and intermediate frequency.

		Frequency range	Channel space	Reference frequency	Intermediate frequency
U.S.A.	① MW1	530～1 620 kHz	10 kHz	10 kHz	450 kHz
	MW2	522～1 611 kHz	9 kHz	9 kHz	
	② FM	87.9～107.9 MHz	200 kHz	25 kHz	10.650, 10.675, 10.700, 10.725 MHz
Europe	③ MW	522～1 611 kHz	9 kHz	9 kHz	450 kHz
	LW	146～353 kHz	9 kHz	1 kHz	
	④ FM	87.50～108.00 MHz	50 kHz	25 kHz	10.650, 10.675, 10.700, 10.725 MHz
Japan	MW	522～1 611 kHz	9 kHz	9 kHz	450 kHz
	FM	76.1～89.9 MHz	100 kHz	25 kHz	10.675, 10.700, 10.725, 10.750 MHz

With the DC-20X, the channel spacing can be changed with the switch provided on the rear panel. When this switch is in the up position, the channel spacing is set as shown in ③ in the table above. When it is in the down position, the channel spacing is set as shown in ① in the table. The above channel space settings are not changed when the switch setting is changed after the power has been turned on. (To change the channel spacing after the power has been turned on, set the selector to a position other than AM (MW) or FM position, then return it to the AM (MW) or FM position.)

Tuning Function

(1) AUTO tuning (sawtooth wave mode)

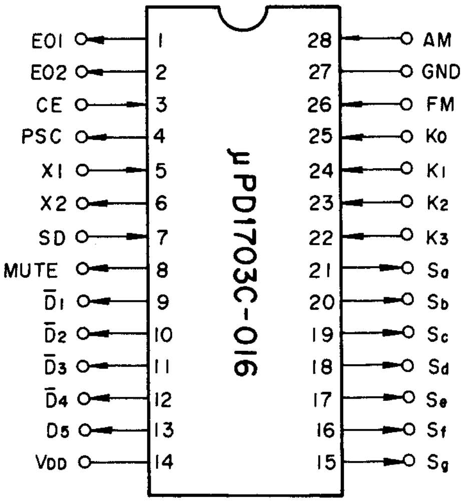
- AUTO UP
- AUTO DOWN ······· Tuning is automatically stopped when a high level signal is detected at the SD terminal and the signal is received.

(2) MANUAL tuning

- MANUAL UP
- MANUAL DOWN ··· Tuning in steps with the momentary switch. Fast tuning is performed when the switch is pressed for 0.5 seconds or more, and continues until the switch is released.

(3) Preset memory tuning

7 stations for FM
A total of 7 stations for LW and MW (can be randomly accessed)



CIRCUIT DESCRIPTION

Pin No.	Symbol	Terminal name	Description
1 2	EO_1 EO_2	Error Out	Charge pump output for the phase detector which is one of the components of the PLL. When the divided local frequency is higher than the reference frequency, these terminals output high level signals. When it is lower, they output low level signals. When the frequencies are equal, these terminals float. EO_1 and EO_2 output identical signals simultaneously; therefore they may be connected to the LPF (low pass filter) for either MW/LW or FM.
3	CE	Chip Enable	Chip enable input. High level — Normal operation Low level — Memory backup operation (Display OFF, PLL inactive, internal clock generator OFF) During memory backup operation, this chip consumes less than 10 μA of current. A level must continue for more than 134 μs or the processor does not recognize it as a level change.
4	PSC	Prescaler Control	Outputs the signal which alternates the prescaler division ratio when the pulse swallow system is used for frequency division (for FM reception). Connected to prescaler μPB553AC. Its frequency division ratios are alternated between 1/16 and 1/17.
5 6	X1 X2	X'tal	A 4.5 MHz crystal is connected across these terminal.
7	SD	Station Detector	A signal is input to this terminal when a broadcast signal is received during AUTO tuning (AUTO UP/DOWN). The signal must be input within 75 ms after the PLL has locked.
8	MUTE	MUTE	Outputs the muting signal which reduces the shock noise generated when the PLL unlocks. The signal level is high when active. The signal level drops to low when a low level signal is applied to the CE terminal. The high level continues: About 700 ms during band switching, About 200 ms (for each step) during MANUAL tuning, About 200 ms after a high level signal has been input to the SD terminal during AUTO tuning, and About 450 ms during preset memory tuning.
9 ~ 13	$\overline{D_1} \sim \overline{D_5}$	Digit Outputs	These terminals output the display digit drive signals. These signal levels are high when active.
14	VDD	VDD	5V ±10% is supplied during normal operation. This can be lowered to 3.0V during backup operation. The rise time of VDD must be less than 500 ms, if it is too long, initialization may fail.
15 ~ 21	Sa ~ Sg	Segment Outputs	These terminals output the display segment drive signals and key return signals. The signal levels are high when active. A voltage of up to 30V can be applied to these terminals, so they can be directly connected to the segment terminals of the FIP (fluorescent display tube).

CIRCUIT DESCRIPTION

Pin No.	Symbol	Terminal name	Description
22 ~ 25	$K_0 \sim K_3$	Key Return Signal Inputs	Key return signals from the external key matrix are input to these terminals.
26	FM	FM Local Oscillator Signal Inputs	The FM local oscillator signal frequency divided by the prescaler (1/16 or 1/17) is input to this terminal. This terminal is connected internally to an AC amplifier; therefore, DC components should be cut from the input signal with a capacitor.
27	GND	GND	Connected to system ground.
28	AM	AM Local Oscillator Signal Inputs	The MW/LW local frequency is input to this terminal. This terminal is internally connected to an AC amplifier; therefore, DC components should be cut from the input signal with a capacitor.

Key Matrix System

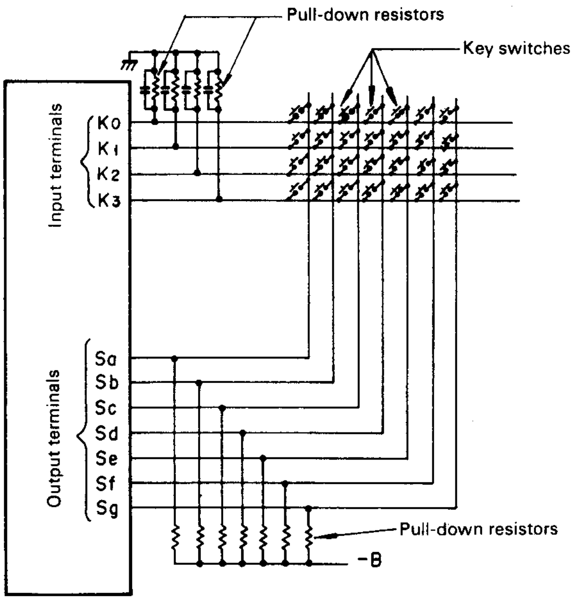
In the key matrix system, many key switches are divided into several groups. These groups are scanned sequentially to read the status of each key. This system is also called the dynamic key scan system.

The above figure shows the principle of the key switch input circuit used in the DC-20X. The input terminals are grounded through the pull-down resistors so that they do not float when no key switch is pressed.

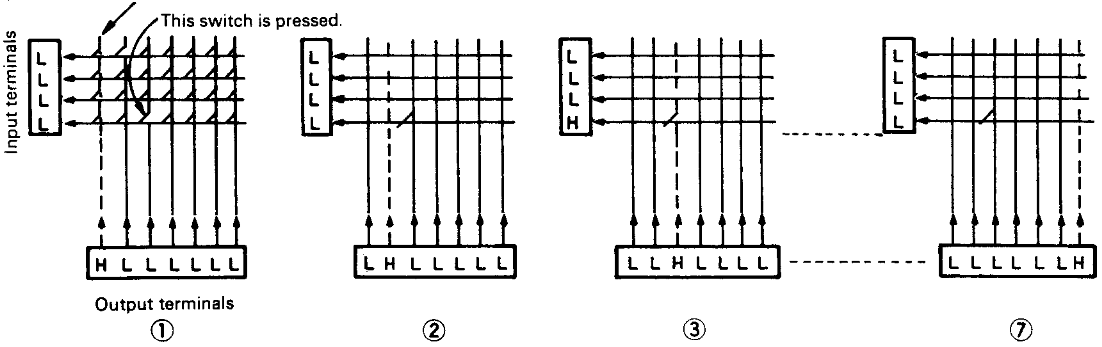
Each output terminal is set to high in turn by the program; only one terminal is at high at a time. Therefore, the status of the 4 key switches at the intersections between the 4 input terminal lines and the line (group selection line) connected to the terminal which is currently high can be input at one time.

The status of all 28 key switches can be input in 7 ms when the output terminals are scanned at 1 ms intervals. This period is short enough compared with the time required for a human being to press a key switch that any key depression is always detected by this method. The key pressed can be identified from the input terminal to which the high level is input and the output terminal from which the high level is output.

Key switch input circuit using the matrix system


Pull-down resistors
Key switches
Input terminals
Ko
K1
K2
K3
Output terminals
Sa
Sb
Sc
Sd
Se
Sf
Sg
Pull-down resistors
-B

Matrix system operation


Group selecting line
This switch is pressed.
Input terminals
L L L L
H L L L L L L
Output terminals
①
L L L L
L H L L L L L
②
L L L H
L L H L L L L
③
L L L L
L L L L L L H
⑦

CIRCUIT DESCRIPTION

1. Key Matrix Configuration

1-1 Key matrix arrangement

OUT \ IN	K0 (25)	K1 (24)	K2 (23)	K3 (22)
Sa (21)	☐ DOWN	☐ UP	☐ MEMORY	☐ TRACKING POINT PRESET
Sb (20)	▨ M4	▨ M3	▨ M2	▨ M1
Sc (19)		▨ M7	▨ M6	▨ M5
Sd (18)		☐ LW	▨ FM	▨ MW
Se (17)				
Sf (16)	▧ 9KHz/10KHz		▨ AUTO/MANUAL	
Sg (15)	▧ BAND 0	▧ BAND 1	▧ IF 1	▧ IF 0

☐ denotes a momentary switch.

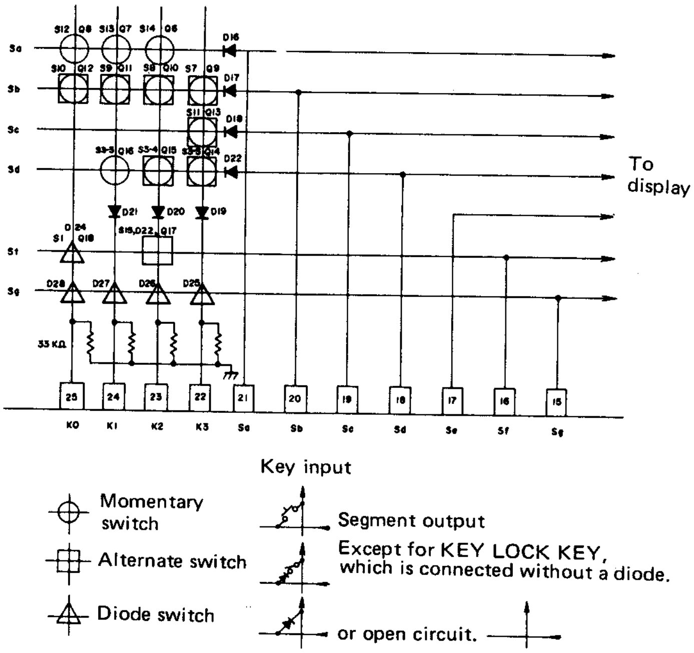
▨ denotes a mode selecting alternate switch.

▧ denotes an initialization diode switch.

☐ denotes an open circuit.

Numbers in parentheses are pin numbers.

1-2. Key matrix switch connection


Sa
Sb
Sc
Sd
Sf
Sg
S12 Q8
S13 Q7
S14 Q6
D16
S10 Q12
S9 Q11
S8 Q10
S7 Q9
D17
S11 Q13
D18
S3-5 Q16
S3-4 Q15
S3-3 Q14
D22
D21
D20
D19
D24
S1 Q18
S15,D23 Q17
D28
D27
D26
D25
33 KΩ
25
24
23
22
21
20
19
18
17
16
15
K0
K1
K2
K3
Sa
Sb
Sc
Sd
Se
Sf
Sg
To display
Key input
Momentary switch
Alternate switch
Diode switch
Segment output
Except for KEY LOCK KEY, which is connected without a diode.
or open circuit.

CIRCUIT DESCRIPTION

2. Key Matrix Explanation

2-1. Initialization key matrix

Three types of diode switches are used in the initialization key matrix circuit as shown below. All diode switches are read by the microprocessor when power is first supplied to the VDD terminal, or when the level at the CE terminal changes from low to high.

The 9 kHz/10 kHz switch is read constantly, but the PLL data and display contents do not change until a momentary switch (UP, DOWN, S1 ~ S7, etc.) is pressed.

(1) FM IF offset setting switches
IF0 and IF1

(2) FM band frequency range setting switches
BAND 0 and BAND 1

(3) MW band channel space and reference frequency setting switch
9 kHz/10 kHz

Short the intersections of the initialization key matrix with diodes as required and leave the remaining intersections open. (See the following table).

<table>
<tr><th>Symbol</th><th>Function</th></tr>
<tr><td>IF 1
IF 0</td><td>These switches select the IF frequency from among four frequencies as shown below.
<table>
<tr><th>IF 1 (D26)</th><th>IF 0 (D25)</th><th>U.S.A.</th><th>Europe</th><th>Japan</th><th>Reference:</th></tr>
<tr><td>① Open</td><td>Open</td><td>10.700 MHz</td><td>10.700 MHz</td><td>10.700 MHz</td><td rowspan="4">Ceramic filter center frequency
Red: 10.700 MHz
Blue: 10.675 MHz
Orange: 10.725 MHz
Black: 10.650 MHz
White: 10.750 MHz</td></tr>
<tr><td>② Open</td><td>Short</td><td>10.725 MHz</td><td>10.725 MHz</td><td>10.675 MHz</td></tr>
<tr><td>③ Short</td><td>Open</td><td>10.650 MHz</td><td>10.650 MHz</td><td>10.750 MHz</td></tr>
<tr><td>④ Short</td><td>Short</td><td>10.675 MHz</td><td>10.675 MHz</td><td>10.725 MHz</td></tr>
</table>
In the U.S.A. and Europe, red ceramic filters can be used in the case of ①, orange in the case of ②, black in the case of ③ and blue in the case of ④.</td></tr>
<tr><td>BAND 1
BAND 0</td><td>These switches select the FM frequency range as shown below.
<table>
<tr><th>BAND 1 (D28)</th><th>BAND 0 (D27)</th><th>Area</th><th>Frequency range</th><th>Channel space</th></tr>
<tr><td>Open</td><td>Open</td><td>U.S.A.</td><td>87.9 ~ 107.9 MHz</td><td>200 kHz</td></tr>
<tr><td>Open</td><td>Short</td><td>Europe</td><td>87.5 ~ 108.0 MHz</td><td>50 kHz</td></tr>
<tr><td>Short</td><td>Open</td><td>Japan</td><td>76.1 ~ 88.9 MHz</td><td>100 kHz</td></tr>
</table>
* Never short both BAND 0 and BAND 1, or the receiving frequency range will not be correctly set.</td></tr>
<tr><td>9 kHz/10 kHz</td><td>This switch sets the channel space, reference frequency and frequency range on the MW band, regardless of the position of the BAND switches for FM.
<table>
<tr><th>D24, Q18, S1 (9 kHz/10 kHz)</th><th>Frequency range</th><th>Channel space</th><th>Reference Frequency</th></tr>
<tr><td>OPEN</td><td>530 ~ 1620 kHz</td><td>10 kHz</td><td>10 kHz</td></tr>
<tr><td>Short</td><td>522 ~ 1611 kHz</td><td>9 kHz</td><td>9 kHz</td></tr>
</table>
The status of this switch is read by every key matrix scan but the related PLL data and display are not changed until a momentary switch (UP, DOWN, M1 ~ M7, etc.) is pressed.</td></tr>
</table>

CIRCUIT DESCRIPTION

2-2. Alternate switch

Symbol	Function
AUTO/MANUAL	ON.......... AUTO scan OFF......... MANUAL scan Scanning starts when the UP or DOWN momentary switch is pressed after this switch has been set. **Note:** AUTO tuning operation is not interrupted even if this switch is switched during the operation. Scanning is not performed or is unstable (i.e. scanning speed is unstable) if the PLL system is defective.
MW FM LW	Band selection switches. A muting signal of about 750 ms is output from the MUTE terminal when the band is switched.
UP DOWN	Tuning key switches for both AUTO and MANUAL operation. These key switches function as follows. ● When the AUTO/MANUAL switch is set to AUTO: (1) The receiving frequency is raised in the sawtooth wave mode when the UP key is pressed. This operation (AUTO UP operation) stops when a high level signal is applied to the SD terminal. AUTO DOWN operation starts when the DOWN key is pressed during AUTO UP operation. (2) The receiving frequency is lowered in the sawtooth wave mode when the DOWN switch is pressed. This operation (AUTO DOWN operation) stops when a high level signal is applied to the SD terminal. AUTO UP operation starts when the UP switch is pressed during AUTO DOWN operation. * AUTO UP or DOWN operation is performed at the rate of 80 ms/step. * Operation continues as long as the UP key is pressed during AUTO UP operation or the DOWN key is pressed during AUTO DOWN operation. As long as either of these key is held down, the corresponding AUTO operation will not stop even if a high level signal is applied to the SD terminal. ● When the AUTO/MANUAL switch is set to MANUAL: (1) The receiving frequency is increased by 1 step each time the UP key is pressed. (2) The receiving frequency is lowered by 1 step each time the DOWN key is pressed. (3) The receiving frequency changes at the rate of 1 step each 80 ms in the applicable direction when either the UP or DOWN key is held for more than 0.5 seconds. Operation stops when the key is released. * 1 step is equal to 1 channel space. FM: U.S.A. 200 kHz Europe 50 kHz Japan 100 kHz AM: U.S.A. 10 kHz Europe 9 kHz Japan 9 kHz
M1 ~ M7	Preset memory write and read keys. Each key corresponds to one FM preset memory channel and one AM (MW + LW) preset memory channel. ● To preset a frequency, press the MEMORY key, then press one of keys M1 through M7 within 5 seconds; the frequency is stored in the corresponding preset memory channel. ● To read a preset memory channel, press the corresponding memory key (M1 ~ M7). When a memory read is performed after VDD has first been supplied, the frequency of the low end of the selected band is read. (In the U.S.A. FM: 87.9 MHz; AM: 530 kHz).
MEMORY	Enables memory write. The currently displayed frequency is stored in memory when one of key's M1 through M7 is pressed within 5 seconds after this key has been pressed. To clear the memory write enable state, press the UP or DOWN switch or switch the mode selector.

CIRCUIT DESCRIPTION

3. Display

3-1. Display connection

Figure 1 shows an example of display connection. D1 through D5 and Sa through Sg correspond to digit terminals ($\overline{D1}$ through $\overline{D5}$) and segment terminals (Sa through Sg) of μPD 1703C-016, respectively.

The segment terminals of μPD1703C-016 can be directly connected with FIP (the fluorescent display tube) since up to 30V can be applied to these terminals (pin open drain output terminals). The digit signal output circuits of μPD1703C-016 are complementary circuits which output low level signals when active. A 1-stage buffer (PNP transistor; 25A733) is required for each output circuit to which FIP is to be connected.

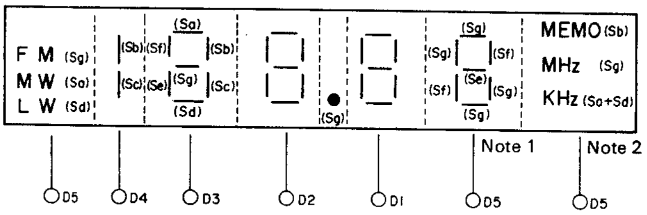


Fig. 1 Display connection

Note 1:

The "kHz" indication is driven by the ORed result of Sa and Sd. If the "LW" indication is not required the "kHz" indication may be driven by Sa alone.

Note 2:

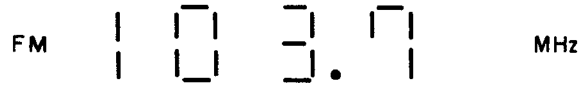
In Europe, frequencies displayed end with either "0" or "5" since the channel spacing is 50 kHz. Care must be taken in connecting the segments. In U.S.A. or Japan, disconnect the last digit or the segment Sg connection.

Segment / Digit	Sa	Sb	Sc	Sd	Se	Sf	Sg
$\overline{D1}$	a	b	c	d	e	f	g
$\overline{D2}$	a	b	c	d	e	f	g
$\overline{D3}$	a	b	c	d	e	f	g
$\overline{D4}$		b	c				
$\overline{D5}$	MW	MEMO		LW	–	I	FM

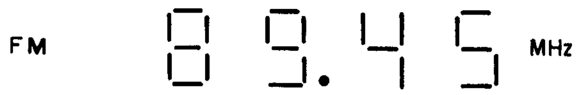
3-2. Display examples

The following are examples of the display when the fluorescent display tube shown in Figure 1 is used.

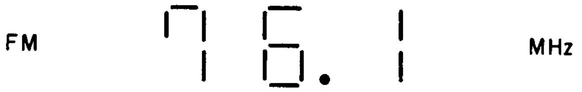
(1) FM (U.S.A.)



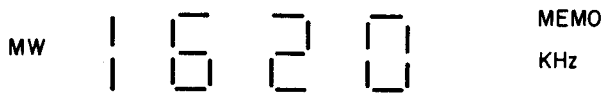
(2) FM (Europe)



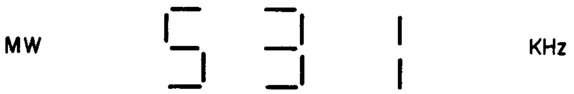
(3) FM (Japan)



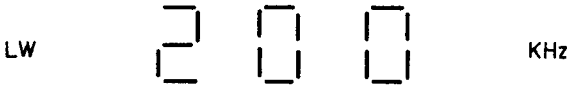
(4) MW (Channel space: 10 kHz)



(5) MW (Channel space: 9 kHz)



(6) LW (Europe)



* The "MEMO" indication lights for 5 seconds after the MEMORY key (momentary switch) is pressed. It goes off when one of the preset keys (M1 ~ M7) is pressed to preset a frequency.

CIRCUIT DESCRIPTION

4. Preset Memory Channel Display*

Figure 2 shows an example of a preset memory channel display circuit.

A BCD (Binary Coded Decimal) code is output from segment terminals Se through Sg according to the timing of digit signal D4. The timing chart is shown in Fig. 3.

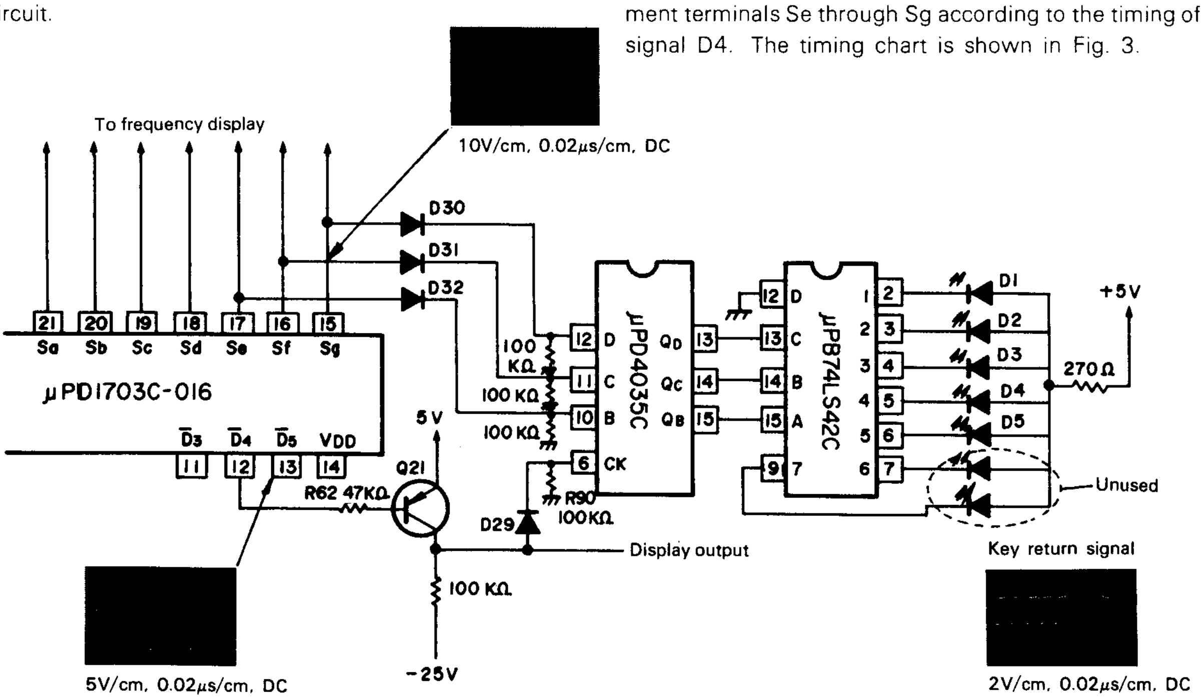

10V/cm, 0.02μs/cm, DC
To frequency display
D30
D31
D32
21 20 19 18 17 16 15
Sa Sb Sc Sd Se Sf Sg
μPD1703C-016
D̄3 D̄4 D̄5 VDD
11 12 13 14
5V
Q21
R62 47KΩ
100 KΩ
100 KΩ
100 KΩ
μPD4035C
12 D QD 13
11 C QC 14
10 B QB 15
6 CK
R90 100KΩ
D29
Display output
100 KΩ
-25V
5V/cm, 0.02μs/cm, DC
μPB74LS42C
12 D 1 2
13 C 2 3
14 B 3 4
15 A 4 5
9 7 5 6
6 7
D1
D2
D3
D4
D5
+5V
270Ω
Unused
Key return signal
2V/cm, 0.02μs/cm, DC

Fig. 2 Preset memory channel display

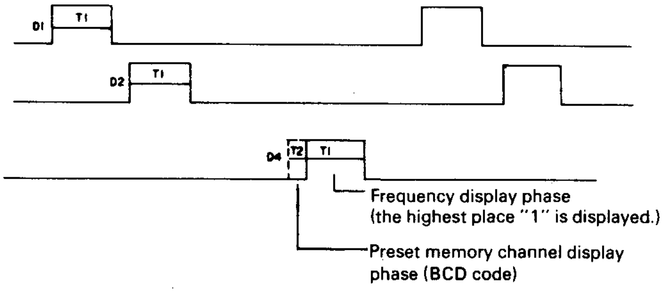

D1
T1
D2
T1
D4
T2
T1
Frequency display phase
(the highest place "1" is displayed.)
Preset memory channel display
phase (BCD code)

Fig. 3 Timing chart

The digit signals which indicate the highest place "1" of the frequency display are output from segment terminals Sb and Sc at phase T1 of digit signal D4. (At this time, segment terminals Se through Sg output blank codes). At phase T2, segment terminals Se through Sg output BCD code for display of the selected preset memory channel. (At this time, segment terminals Sa through Sd output blank codes).

* Preset memory channel display means that a dot indicator (P1 ~ P7) corresponding to a memory channel lights when the corresponding MEMORY key (M1 ~ M7) is pressed (to write or read a frequency).

Since BCD code is output dynamically as shown in the timing chart (Fig. 3), it must be latched so that the display device is driven statically.

(When a display device (such as an LED) which consumes a relatively large current is used for the preset memory channel display and it is dynamically driven, noise may be generated and input to the antenna, RF or IF circuit).

μPD4035C is a D-F/F IC for latching dynamic signals. Since μPD1703C-016 outputs low level digit signals, inverters are used to change them to high level signals for input to μPD4035C. The signal levels are latched when D4 rises.

Output state of segment terminals Sa ~ Sg at phases T1 and T2 of digit signal D4.

Segment Phase	Sa	Sb	Sc	Sd	Se	Sf	Sg
T1	Blank	Highest place "1" or blank		Blank	Blank	Blank	Blank
T2	Blank	Blank	Blank	Blank	BCD code output		

CIRCUIT DESCRIPTION

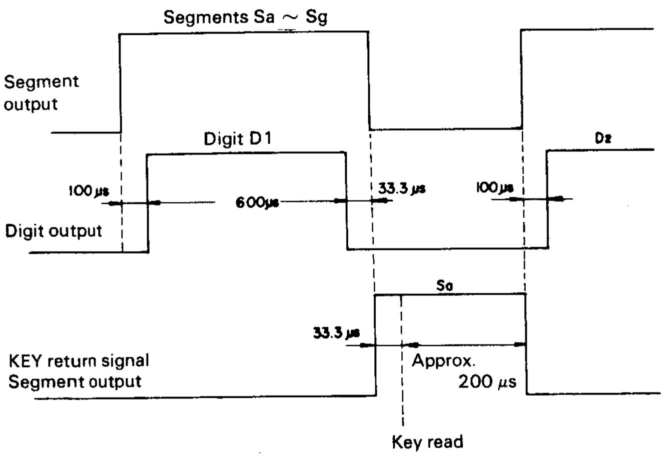
Preset memory channel BCD code output

Sg	Sf	Se	Preset memory channel
0	0	1	P1 (M1 key)
0	1	0	P2 (M2 key)
0	1	1	P3 (M3 key)
1	0	0	P4 (M4 key)
1	0	1	P5 (M5 key)
1	1	0	P6 (M6 key)
1	1	1	P7 (M7 key)

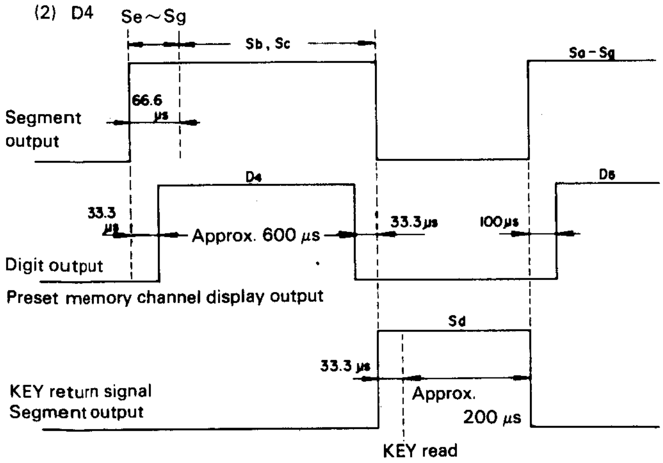
5. Timing Chart

5-1. Display and key read timing

(1) D1 ~ D3, D5

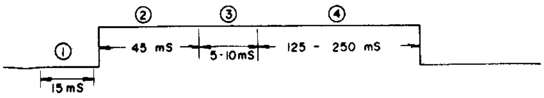

Segments Sa ~ Sg
Segment output
Digit D1
D2
100μs
600μs
33.3μs
100μs
Digit output
Sa
33.3μs
KEY return signal
Segment output
Approx. 200 μs
Key read

(2) D4

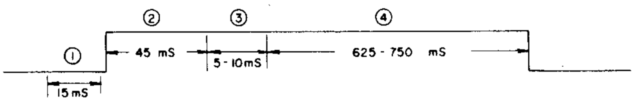

Se~Sg
Sb, Sc
Sa-Sg
66.6 μs
Segment output
D4
D5
33.3 μs
Approx. 600 μs
33.3μs
100μs
Digit output
Preset memory channel display output
Sd
33.3μs
KEY return signal
Segment output
Approx. 200 μs
KEY read

5-2. MUTE timing

(1) MANUAL UP/DOWN

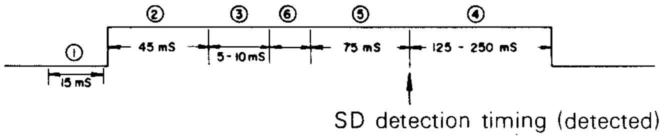

②
③
④
①
45 mS
5-10mS
125 - 250 mS
15 mS

Band edge (Max. freq. → Min. freq. or Min. freq. → Max. freq.)

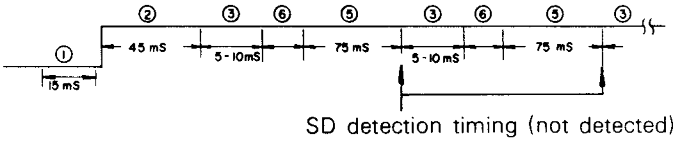

②
③
④
①
45 mS
5-10mS
625 - 750 mS
15 mS

(2) AUTO UP/DOWN

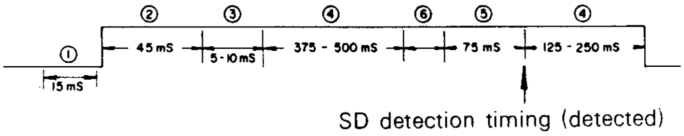
When the SD signal is input:


②
③
⑥
⑤
④
①
45 mS
5-10mS
75 mS
125 - 250 mS
15 mS
SD detection timing (detected)

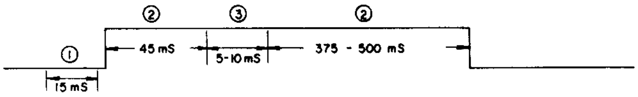
When the SD signal is not input.


②
③
⑥
⑤
③
⑥
⑤
③
①
45 mS
5-10mS
75 mS
5-10 mS
75 mS
15 mS
SD detection timing (not detected)

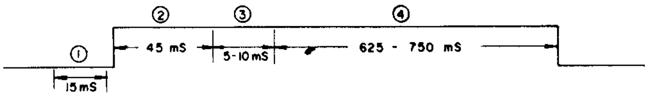
Band edge (Max. freq. → Min. freq. or Min. freq. → Max. freq.)


②
③
④
⑥
⑤
④
①
45 mS
5-10mS
375 - 500 mS
75 mS
125 - 250 mS
15 mS
SD detection timing (detected)

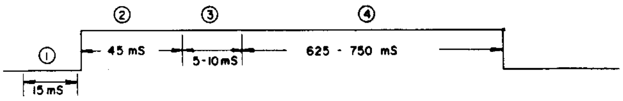
(3) PRESET MEMORY CALL


②
③
②
①
45 mS
5-10mS
375 - 500 mS
15 mS

When the band is switched (MW → LW or LW → MW)


②
③
④
①
45 mS
5-10mS
625 - 750 mS
15 mS

(4) FM/MW/LW switching and Power ON (CE: Low → High)


②
③
④
①
45 mS
5-10mS
625 - 750 mS
15 mS

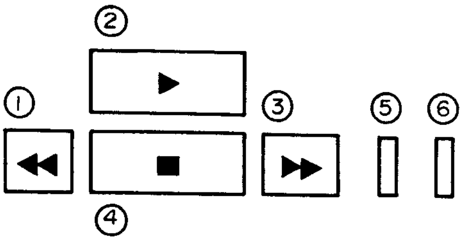
① KEY ON chatter prevention
② Pre-muting
③ Dividing ratio set and display data updated
④ Post-muting
⑤ Scanning
⑥ Time required for PLL to lock

CIRCUIT DESCRIPTION

IV. DECK OPERATION

1. Control Keys

a) Layout



b) Key functions

① **Rewind** — rewind to a beginning of the current selection, skipping back to the beginning of a previous selection, quick re-recording, one side repeat

② **PLAY** — One selection repeat, recording following playback, one side repeat.

③ **Fast forward** — fast forward to beginning of the next selection, skipping forward to the beginning of a following selection

④ **Stop** — (Program clear)

⑤ **Record** — Pause, recording following playback (Note: this unit uses the one-touch recording system.)

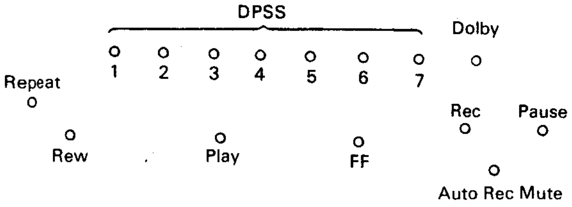
⑥ **Auto Rec Mute (4 seconds)** — (If this key is pressed again during Auto Rec Mute, Auto Rec Mute will be continued for another 4 seconds from that point.)

Note:

One side repeat: ① and ② are pressed simultaneously.
Recording following playback: ② is pressed with ⑤ held down.

---

c) LED layout



LED / Position	Play	FF	Rew	Rec	Pause	Auto Rec Mute	Re-peat	DPSS
STOP	×	×	×	×	×	×	×	×
Play	-○-	×	×	×	×	×	×	×
F.F.	×	☼	×	×	×	×	×	×
Rew	×	×	☼	×	×	×	×	×

LED / Position	Play	FF	Rew	Rec	Pause	Auto Rec Mute	Re-peat	DPSS
Cue	×	☼	×	×	×	×	×	☼
Rev	×	×	☼	×	×	×	×	☼
Rec	-○-	×	×	○	×	×	×	×
Pause	×	×	×	×	○	×	×	×
Auto Rec Mute	-○-	×	×	○	×	-○-	×	×
During one selection repeat	-○-	×	×	×	×	×	○	-○-
During REW	×	×	☼	×	×	×	○	☼
During one side repeat play	-○-	×	-○-	×	×	×	×	×
During one side repeat rewind	☼	×	☼	×	×	×	×	×
During REVIEW for quick re-recording	×	×	☼	×	×	☼	×	×

× : Not lit
○ : Lit
-○- : Blinking slowly
☼ : Blinking rapidly

2. Forward and reverse program selection

Application:

These functions are used to locate and play a selection which is a certain number of selections before or after the current selection.

Operation:

1 Press the ▷▷ or ◁◁ key during playback.

2 When the ▷▷ key or ◁◁ key is pressed N times:
  - For the ▷▷ key, the selection which is N selections after the current selection will be located and played.
  - For the ◁◁ key, the selection which is (N-1) selections before the current selection will be located and played.

3 Any selection up to the 7th one may be selected in the forward direction, and any selection up to the 6th one may be selected in the reverse direction.

4 When the ▷▷ key or ◁◁ key is pressed one time:
  - For the ▷▷ key, the tape will be advanced the beginning of the next selection.
  - For the ▷▷ key, the tape will be rewound to the beginning of the current selection.

5 The dot counter will indicate the number of times the key is pressed for both ② and ④ above.

6 The dot counter is reduced each time a program is passed during forward or reverse selection to indicate the number of the program which is currently being skipped.

CIRCUIT DESCRIPTION

7 Forward/reverse program selection ends when the dot counter goes out and the mechanism automatically shifts to the playback mode of operation.

Note:

Press the applicable key without interruption; it is not possible to add to the program count once the unit enters the program selection mode of operation.

The microprocessor regards any unrecorded section of approximately 100 ms or more as an interval between two selections. The unit always shifts to the PLAY mode of operation via STOP.

3. One selection repeat

Application:

This function is used to cause the selection which is currently being played to be repeated a certain number of times.

Operation:

1 Press the ▷ key during playback.
2 Press the key without interruption as many times as you want the selection to be repeated.
3 The maximum number of repetitions possible is 7.
4 The play mode of operation is maintained after the specified number of repetitions is completed.
5 Press the STOP key to reset the unit during repeated playback.
6 The dot counter counts the number of repetitions.
7 The repeat indicator remains lit during repeated playback.
8 The dot counter is reduced each time one repetition is completed to indicate the number of repetitions remaining. The repeat indicator goes out when repeat operation is completed.

Note:

It is not possible to add to the number of repetitions to be made while repeat operation is being performed. One selection repeat operation begins approximately 600 ms after the ▷ key is released. When an unrecorded section lasting about 3 seconds is encountered, the microprocessor regards it as the unrecorded section between recordings and enters the REVIEW mode of operation. Then, when an unrecorded section lasting about 100 ms is encountered, the unit enters the PLAY mode of operation via STOP.

---

4. One side repeat

Application:

This function is used to cause the entire side of the tape to be repeated from beginning to end.

Operation:

1 Press the ▷ key and ◁◁ key simultaneously.
2 The tape will be played back repeatedly until the STOP key is pressed.
3 During playback, the ▷ and ◁◁ indicators both blink slowly; during rewind, they blink rapidly.

5. Quick re-recording

Application:

This function is used to rewind the tape to the point at which recording was begun when recording is to be started over for any reason. After the tape is rewound, the unit goes to standby.

Operation:

1 Press the ◁◁ key while the unit is in the record mode of operation.
2 The tape will be rewound until an unrecorded section is detected, then the unit will enter AUTO REC MUTE via STOP and pause in standby.
3 The record mode of operation can be restored even during review or AUTO REC MUTE by pressing the record key.

6. Recording following playback

Application:

This function is used when you wish to record additional material immediately after a previously recorded selection.

Operation:

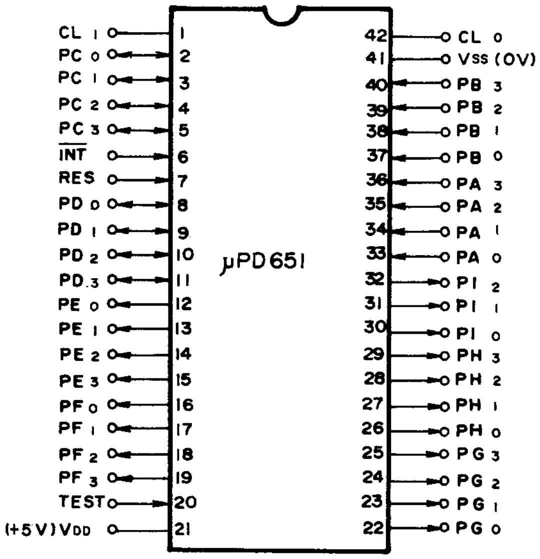
1 Play the tape to listen for the location at which recording is to begin.
2 While monitoring, press the ▷ key while holding down the record key.
3 Recording will begin the moment the ▷ key is pressed.

CIRCUIT DESCRIPTION

V. MICROPROCESSOR μPD651

A microprocessor is used to control operation of the cassette section. The microprocessor used is the μPD651, with ROM manufactured according to Kenwood's specifications.

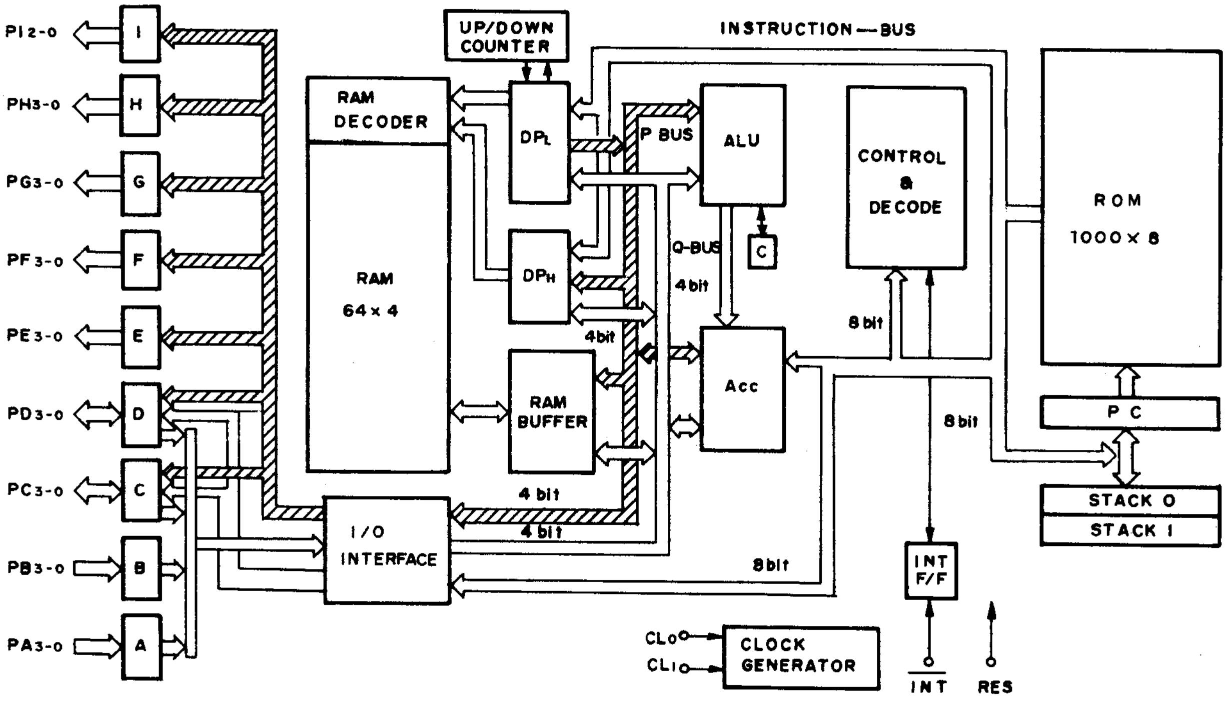
Pin connections (top view)


μPD651
CL 1 1
PC 0 2
PC 1 3
PC 2 4
PC 3 5
INT 6
RES 7
PD 0 8
PD 1 9
PD 2 10
PD 3 11
PE 0 12
PE 1 13
PE 2 14
PE 3 15
PF 0 16
PF 1 17
PF 2 18
PF 3 19
TEST 20
(+5V) VDD 21
42 CL 0
41 VSS (OV)
40 PB 3
39 PB 2
38 PB 1
37 PB 0
36 PA 3
35 PA 2
34 PA 1
33 PA 0
32 PI 2
31 PI 1
30 PI 0
29 PH 3
28 PH 2
27 PH 1
26 PH 0
25 PG 3
24 PG 2
23 PG 1
22 PG 0

Pin Names

$CL_{0,1}$:	External LC connection for clock signal generation
$\overline{INT}$:	Interrupt
RES:	Reset
PA_{3-0}:	Input ports A_{3-0}
PB_{3-0}:	Input ports B_{3-0}
PC_{3-0}:	Input/output ports C_{3-0}
PD_{3-0}:	Input/output ports D_{3-0}
PE_{3-0}:	Output ports E_{3-0}
PF_{3-0}:	Output ports F_{3-0}
PG_{3-0}:	Output ports G_{3-0}
PH_{3-0}:	Output ports H_{3-0}
PI_{2-0}:	Output ports I_{2-0}
TEST:	Test

Block diagram


PI2-0
PH3-0
PG3-0
PF3-0
PE3-0
PD3-0
PC3-0
PB3-0
PA3-0
I
H
G
F
E
D
C
B
A
UP/DOWN COUNTER
INSTRUCTION—BUS
RAM DECODER
RAM 64×4
DPL
DPH
RAM BUFFER
P BUS
ALU
Q-BUS
C
4 bit
4bit
Acc
CONTROL & DECODE
8 bit
ROM 1000×8
P C
STACK 0
STACK 1
8 bit
4 bit
4 bit
I/O INTERFACE
8 bit
INT F/F
CL0
CL1
CLOCK GENERATOR
INT
RES

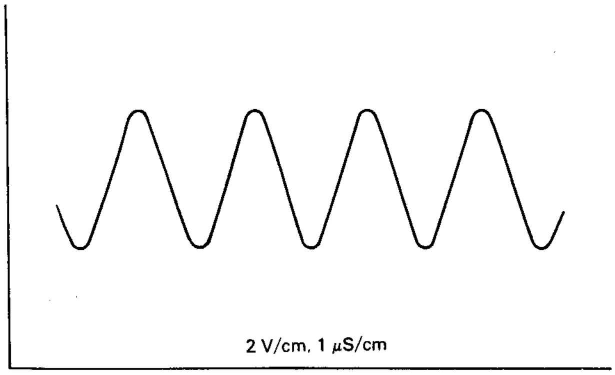
DP: Data pointer
ACC: Accumulator
C: Carry F/F

ALU: Arithmetic and logic unit
PC: Program counter

CIRCUIT DESCRIPTION

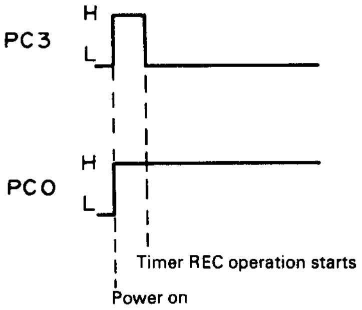
Correspondence of the terminals

Pin 1 (CL_1): Pin for external connection of the LC oscillator circuit (L26, C100 and C101) for internal clock signal generation.

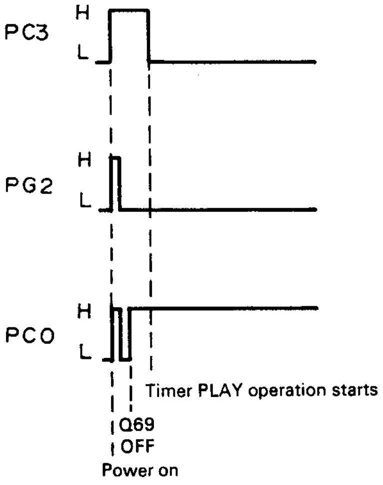


Pin 2 (PC_0): When PC_3 is "H"; this becomes the input pin for detection of the T.STAND BY switch.

① Timer REC detection (S2: REC position)
When the power is turned on, PC_3 becomes "H", Q69 goes ON, and the voltage on the cathode side of D88 becomes 0V. When the cassette lid is closed, +9V is applied to PC_0 through D94, S2, and D81. D94 (a 4.1V Zener diode) and D81 (1S1555) drop the voltage so that the "H" input at PC_0 is approximately 4.3V. This causes the microprocessor to start REC operation.



② Timer PLAY detection (S2: PLAY position)
When the power is turned on, PC_3 becomes "H", Q69 goes ON, and the voltage on the cathode side of D88 becomes 0V. PC_0 becomes "H" momentarily when PG_2 becomes "H", then becomes "L" at the same time PG_2 becomes "L". When the microprocessor detects this condition, it starts PLAY operation. Afterwards, Q69 goes OFF and PC_0 becomes "H".
This pin is used for power supply detection when PC_3 is "L". When PC_3 is "L", approximately 4.3V is applied to PC_0 through D88 and D83. This voltage drops when the power is turned off. The microprocessor detects this and starts the shut off (stop) operation.



Pin 3 (PC_1): Input pin used for detection of the record enable (record-lockout tab) switch. This pin is "H" when recording is possible.

Pin 4 (PC_2): Pin for output of the LED on/off signal. This pin is "L" during STOP, "H" while the microprocessor is reading program selection control or the number of repetitions, and "L" and "H" in alternation at other times. The frequency with which the signal alternates between "L" and "H" is higher during FF, REW, CUE and REVIEW, and is lower during PLAY, REC, AUTO REC MUTE and PAUSE.

Pin 5 (PC_3): This is an output pin. "H" is output during STOP, and "L" is output at other times. "H" is output even during a momentary STOP. This pin is also used for switching the function of PC_0.

Pin 6 ($\overline{INT}$): This input pin is not used. "H" is connected to it.

Pin 7 (RES): This is the reset signal input pin. "H" is applied to it when the power is turned on or off and the microprocessor is reset when it becomes "L". In other words, address 000 is set in the program counter of the microprocessor and INT F/F is reset. Also, the open drain transistors of ports C-I go off, then the program starts from address 000.

Pin 8 (PD_0): This pin is for output of the signal for switching the functions of PB_{1-3}. It is normally "L", but "H" is output as necessary before and after solenoid pulses.

Pin 9 (PD_1): Pin for output of the REW solenoid drive signal. "H" is output for 80-100 ms when the REC, PLAY, STOP or REW buttons are pressed.

Pin 10 (PD_2): Pin for output of the FF solenoid drive signal. "H" is output for 80 ~ 100 ms when the REC, PLAY, STOP or FF buttons are pressed.

Pin 11 (PD_3): Unused.

Pin 12 (PE_0): Pin for output of the signal used for muting. "L" is output when CUE, REVIEW or PLAY rises or when the power is turned on; "H" is output at other times.

Pin 13 (PE_1): REC mute pin. "H" is output during AUTO REC MUTE (about 4 seconds).

Pin 14 (PE$_2$): Pin for output of the source ON signal. "H" is output during STOP, FF, REW, REC, PAUSE, tape rewind for quick re-recording, and AUTO REC MUTE; "L" is output during PLAY, one selection repeat, program selection and one side repeat. Output does not change during a momentary STOP.

Pin 15 (PE$_3$): Pin for output of the signal used for driving the motor. "L" is output during STOP and "H" is output at other times. Also, "H" is output for about 320 ms when the power is turned on so that the mechanism will move to the STOP state if it is not already in it.

Pin 16 (PF$_0$): Pin for output of the signal used for switching the output level of the unrecorded section detection circuit. "H" is output during PLAY, REC, AUTO REC MUTE, and one side repeat; "L" is output at other times. This pin is also used for output of the LED drive signal for PLAY.

Pin 17 (PF$_1$): Pin for output of the FF LED drive signal. "H" is output during FF and CUE. "H" is also output when the FF key is pressed for forward program selection.

Pin 18 (PF$_2$): Pin for output of the REW LED drive signal. "H" is output during REW, REVIEW, and one side repeat. "H" is also output when the REW key is pressed for reverse program selection.

Pin 19 (PF$_3$): Pin for output of the repeat LED drive signal. "H" is output during repeat. "H" is also output each time a key is pressed when the number of repetitions is being entered.

Pin 20 (TEST): This pin is used for testing the internal logic. This pin is connected to Vss, since is is not required when the microprocessor is used.

Pin 21 (Vss): 5V power supply (4.5 ~ 5.5V operating range). The microprocessor will not operate properly if the prescribed supply voltage is not present.

Pin 22 (PG$_0$): This pin outputs "H" during REC and AUTO REC MUTE (approximately 4 seconds).

Pin 23 (PG$_1$): This pin outputs "H" during REC PAUSE.

Pin 24 (PG$_2$): This pin outputs "H" momentarily when the power is turned on. It is used for timer PLAY detection.

Pin 25 (PG$_3$): This pin outputs "H" during REC, PAUSE, and AUTO REC MUTE.

Pins 26 ~ 32 (PH$_0$ ~ PI$_2$): These pins output the LED drive signals for selection number display and number-of-repetitions display.

Pin 33 (PA$_0$): "H" is input to this pin when the STOP key is pressed.

Pin 34 (PA$_1$): "H" is input to this pin when the PLAY key is pressed.

Pin 35 (PA$_2$): "H" is input to this pin when the FF key or REW key is pressed.

Pin 36 (PA$_3$): "H" is input to this pin when the REC/PAUSE or AUTO REC MUTE key is pressed.

Pin 37 (PB$_0$): "H" is input to this pin when the STOP, FF or AUTO REC MUTE key is pressed.

Pin 38 (PB$_1$): This pin is used for input of the reverse enable signal when PD$_0$ is "L". However, this unit does not feature this mode of operation.
When PD$_0$ is "H", REW solenoid signal ("H" for 80 ~ 100 ms if ON) is input.

Pin 39 (PB$_2$): This pin is used for input of the beginning-of-selection (unrecord section) detection signal when PD$_0$ is "L". When "H" is detected continuously, the microprocessor regards it as the interval between selections; when "L" is detected, the microprocessor regards it as a recorded section.
When PD$_0$ is "H", FF solenoid signal ("H" for 80 ~ 100 ms if ON) is input.

Pin 40 (PB$_3$): This pin is used for input of the tape end detection signal when PD$_0$ is "L". Hall IC DN6838 outputs "H" and "L" in alternation while the deck is running. When the deck stops running (that is, when the magnet pulley stops turning), the output of the Hall IC stops changing. This signal is used to cause the microprocessor to perform the auto-shut off operation.

Pin 41 (VGG): GND terminal.

Pin 42 (CL$_0$): Pin for connecting the external LC oscillator circuit for internal clock signal generation.

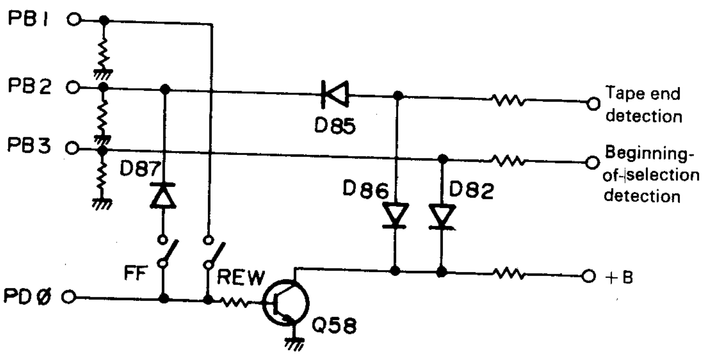
VI. TRANSISTOR OPERATION IN THE LOGIC (X05-2060-10) (D/7) unit

Q57: Inverter

Sets pin 6 of connector (50) to "L" during REC, PAUSE, and REC MUTE.

Q58: Used for switching input to PB$_{1-3}$.

When PD$_0$ is "L", Q58 is OFF and input terminals PB$_{1-3}$ are used for reverse enable switching, tape end detection, and beginning-of-selection detection, respectively. When PD$_0$ is "H", Q58 is on and these terminals are used for inputs of solenoid statuses.



Q59: Used for switching the clock frequency for the microprocessor.

When Q59 is OFF, the clock frequency (approximately 400 kHz) is determined by L26 and C100.
When Q59 is ON, the clock frequency is reduced by adding C101 to the oscillator circuit.
Q59 is turned ON and OFF with the BEAT CANCEL switch.

CIRCUIT DESCRIPTION

Q60: Used to clear reset.

"H" is applied to pin 7 when the power is turned on. Q60 goes ON soon afterwards, pin 7 becomes "L" and the microprocessor is reset and starts operating. When the power is turned off, D97 causes the voltage at the base of Q60 to become negative so that it goes OFF immediately. This causes pin 7 to become "H" momentarily, then to become "L" again so that the microprocessor is reset.

Q61, 63: Used to drive the REW solenoid.

Q62, 64: Used to drive the FF solenoid.

Q65: Inverter

Q66: Inverter

Q67, 68: Used to drive the motor.

Q69: Used for switching the function of PC$_0$.

Mechanism reset switch (pin 1 of connector 47):

This is an emergency switch which is shorted on both sides to clear the mechanism when it locks. This switch is normally open.

Connector states of the logic (X05-2060-10) (D7)

H: about 5V
L: 0V

MODE / Pins	STOP	PLAY	FF	REW	CUE	RE-VIEW	REC	PAUSE	REC MUTE
㊿-3	L	L	L	L	L	L	H	L	H (4 sec)
㊿-4	L	H	L	L	L	L	H	L	H (4 sec)
㊿-5	H	L*	L*	L*	L*	L*	L*	H	H (4 sec)
㊿-6	H	H	H	H	H	H	L	L	L
㊹-1	L	H	L	L	H	H	L	L	L
㊹-2	L	L	L	L	H	H	L	L	L
FF SOLE-NOID SW	OFF	ON	ON	OFF	ON	OFF	ON	OFF	—
REW SOLE-NOID SW	OFF	ON	OFF	ON	OFF	ON	ON	OFF	—

* Takes 6 seconds for H to change to L.

STOP – PLAY (H: for 320 mS)

VII. REC AMP (X28-1410-10) A/4

Switching between the playback circuit and the record circuit is performed using transistor switching. The transistor statuses are as shown in the table.

Switching transistor states in REC AMP (X28-1410-10)

Mode / Tran-sistor	PLAY	REC	REW	FF	STOP	REC PAUSE	REC MUTE
Q1~4	ON	OFF	ON	ON	ON	OFF	
Q5,6	OFF	ON	OFF	OFF	OFF	ON	
Q7,8	OFF	ON	OFF	OFF	OFF	ON	
Q9, 10	OFF	ON	OFF	OFF	OFF	ON	
Q13,14	ON	—	ON	ON	ON	OFF	
Q15,16	ON	OFF	ON	ON	ON	OFF	
Q17,18	OFF	ON	OFF	OFF	OFF	ON	
Q19,20 Q22,23	ON	OFF	ON	ON	ON	ON	ON
Q24,25 Q28	ON	OFF	ON	ON	ON	OFF	OFF
Q26,27	OFF	ON	OFF	OFF	OFF	ON	
Q29	OFF	OFF	ON	ON	ON	ON	
Q30,31	ON	ON	OFF	OFF	OFF	OFF	
Q35	ON	OFF	ON	ON	ON	OFF	OFF
Q36,37	OFF	ON	OFF	OFF	OFF	OFF	ON (4 sec)

1. ALC circuit

When the level of signal input increases during recording, the signal rectified by D1 controls Q21 to place Q13 (Q14) in a semiconducting state so that the level of the input signal to Q11 (Q12) is reduced.

Q 13 (Q14) is ON during PLAY.

2. Unrecorded section detection circuit

This circuit is composed of Q32 and Q33. Although Q29 is OFF during PLAY, it is ON during CUE and REVIEW so that the voltage of the signal to the detection circuit is divided. Q31 goes ON during PLAY so that the performance of the integrating circuit of the detection circuit is enhanced.

ADJUSTMENT (TUNER SECTION)

Alignment points and input and output settings are indicated on each printed circuit board.

NO.	ITEM	SYSTEM CONNECTIONS	TEST INSTRUMENTS SETTING	TUNER (RECEIVER) SETTING	ALIGNMENT POINTS	ALIGN FOR	FIG. NO.
FM SECTION							
1	**DISCRIMI-NATOR**	(A)/Connect a DC voltmeter across R9 (X05-2060-10 A/7).	100.1 MHz 1 kHz ±75 kHz dev 60 dB (ANT input)	FM 100.1 MHz	L4 (X05-2060-10 A/7)	0V	(a)
2	**VCO**	(A)/Connect a frequency counter to the junction of R82 and VR6 (X09-1750-10 D/7) via an AC voltmeter.	100.1 MHz 0 dev 60 dB (ANT input)	FM 100.1 MHz	VR6 (X09-1750-10 D/9)	Frequency: 76 kHz ±200 Hz	(b)
VCO: Voltage Controlled Oscillator							
3	**DISTORTION (STEREO) Except for E type**	(C)/(B)	100.1 MHz 1 kHz ±68.25 kHz dev Selector: L-R Pilot: ±6.75 kHz dev 60 dB (ANT input)	FM 100.1 MHz	T2 (Front end)	Minimum distortion.	
3	**DISTORTION (STEREO) For E type**	(C)/(B)	100.1 MHz 1 kHz ±40 kHz dev Selector: L or R Pilot: ±6 kHz dev 60 dB (ANT input)	FM 100.1 MHz	T2 (front end)	Minimum distortion	
AM SECTION							
(1)	**RF ALIGNMENT (MW)**	Connect a DC voltmeter to the junction of R18 and R19 (X05-2060-10 A/7)	–	AM (MW), MANUAL 522 kHz or 530 kHz	L5 (X05-2060-10 A/7)	DC voltage for ground: 1.0V (522 kHz) 1.1V (530 kHz)	(c)
(2)	**RF ALIGNMENT (MW)**	(D)/(B)	1400 kHz or 1404 kHz 400 Hz, 30% mod	AM (MW) 1400 kHz or 1404 kHz	TC1 (X05-2060-10 A/7)	Maximum amplitude and symmetry of the oscilloscope display	
(3)	**IF TRANS-FORMER**	(D)/(B)	990 kHz 400 Hz, 30% mod	AM (MW) 990 kHz	L10 (X05-2060-10 A/7)	Maximum amplitude and symmetry of the oscilloscope display	
LW SECTION (DC-20XL ONLY)							
(4)	**RF ALIGNMENT (LW)**	Connect a DC voltmeter to the junction of R18 and R19 (X05-2060-72 A/7)	–	LW, MANUAL 146 kHz	L6 (X05-2060-72 A/7)	DC voltage for ground: 1.2V	
(5)	**RF ALIGNMENT (LW)**	(D)/(B)	317 kHz 400 Hz, 30% mod	LW 317 kHz	TC2 (X05-2060-72 A/7)	Maximum amplitude and symmetry of the oscilloscope display	

REGLAGES (SECTION TUNER)

Les points de réglage et les réglages de l'entrée et de la sortie sont indiqués sur chaque plaque de circuit inprimée.

N°	ITEM	RACCORDEMENTS DU SYSTEME	REGLAGE DE L'APPAREILLAGE	REGLAGE DU TUNER (AMPLI-TUNER)	POINTS DE L'ALIGNEMENT	ALIGNER POUR	FIG. N°
SECTION MF							
1	**DISCRIMINATEUR**	(A)/Connecter un voltmètre CC sur R9 (X05-2060-10 A/7)	100,1 MHz 1 kHz ±75 kHz dév 60 dB (Entrée ANT)	FM 100,1 MHz	L4 (X05-2060-10 A/7)	0V	(a)
2	**OSCILLATEUR CONTROLE PAR LA TENSION**	(A)/Connecter un compteur de fréquence à la jonction de R82 et VR6 (X09-1750-10 D/9) par un voltmètre CA.	100,1 MHz 0 dév 60 dB (Entrée ANT)	FM 100, 1 MHz	VR6 (X09-1750-10 D/9)	Fréquence: 76 kHz ±200 Hz	(b)
3	**DISTORSION (STEREO) Exceptè E type**	(C)/(B)	100,1 MHz 1 kHz ±68,25 kHz dév SELECTION: L ou R Signal pilote: ±6,75 kHz dév 60 dB (Entrée ANT)	FM 100,1 MHz	T2 (Partie frontale)	Distortion minimale	
3	**DISTORTION (STEREO) Pour E type**	(C)/(B)	100,1 MHz 1 kHz ±40 kHz dév SELECTION: L ou R signal pilote: ±6 kHz dév 60 dB (Entrée ANT)	FM 100,1 MHz	T2 (Partie frontale)	Distortion minimale	
SECTION MA							
(1)	**ALIGNEMENT H.T. (MW)**	Connecter un voltmètre CC à la jonction de R18 et R19 (X05-2060-10 A/7)	–	AM(MW), MANUAL 522 kHz ou 530 kHz	L5 (X05-2060-10 A/7)	Tension continue pour terre: 1,0V (522 kHz) 1,1V (530 kHz)	(C)
(2)	**ALIGNEMENT H.T. (MW)**	(D)/(B)	1400 kHz ou 1404 kHz 400 Hz, 30% mod	AM (MW) 1400 kHz ou 1404 kHz	TC1 (X05-2060-10 A/7)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope	
(3)	**TRANSFORMATEUR F.I.**	(D)/(B)	990 kHz 400 Hz, 30% mod	AM (MW) 990 kHz	L10 (X05-2060-10 A/7)	Amplitude et symétrie maximal de l'affichage de l'oscilloscope	
SECTION LW (DC-20XL)							
(4)	**ALIGNEMENT H.T. (LW)**	Connecter un voltmètre CC à la jonction de R18 et R19 (X05-2060-72 A/7)	–	LW, MANUAL 146 kHz	L6 (X05-2060-72 A/7)	Tension continue pour terre: 1,2V	
(5)	**ALIGNEMENT H.T. (LW)**	(D)/(B)	317 kHz 400 Hz, 30% mod	LW 317 kHz	TC2 (X05-2060-72 A/7)	Amplitude et symetrie maximale de l'affichage de l'oscilloscope	

ABGLEICH (TUNER-ABTEILUNG)

Die Abgleichpunkte und Eingangs- und Ausgangs- einstellungen sind auf jeder gedruckter Schaltung angegeben.

NR.	GEGENSTAND	SYSTEM-ANSCHLÜSSE	PRÜFEINRICHTUNG-EINSTELLUNG	TUNER (RECEIVER)-EINSTELLUNG	ABGLEICH-PUNKTE	ABGLEICHEN FÜR	ABB. NR.
UKW-ABTEILUNG							
1	**DISKRIMINATOR**	(A)/Einen Gleichspannungsmesser über R9 anschließen (X05-2060-10 A/7)	100,1 MHz 1 kHz ±75 kHz Hub 60 dB (ANT-Eingung)	FM 100,1 MHz	L4 (X05-2060-10 A/7)	0V	(a)
2	**SPANNUNGS GEREGELTER OSZILLATOR**	(A)/Einen Frequenzmesser zur Verbindung von R82 und VR6 (X09-1750-10 D/9) über einem Wechselspannungsmesser anschließen.	100,1 MHz 0 Hub 60 dB (ANT-Eingang)	FM 100,1 MHz	VR6 (X09-1750-10 D/9)	Frequenz: 76 kHz ±200 Hz	(b)
3	**KLIRRFAKTOR (STEREO) Ausgenommen E type**	(C)/(B)	100,1 MHz 1 kHz ±68,25 kHz Hub Wähler: L oder R Pilotton: ±6,75 kHz Hub 60 dB (ANT-Eingang)	FM 100,1 MHz	T2 (Frontende)	Minimaler Klirrfaktor	
3	**KLIRRFAKTOR (STEREO) Für E type**	(C)/(B)	100,1 MHz 1 kHz ±40 kHz Hub Wähler: L oder R Pillotton: ±6 kHz Hub 60 dB (ANT-Eingang)	FM 100,1 MHz	T2 (Frontende)	Minimaler Klirrfaktor	
MW-ABTEILUNG							
(1)	**HF-ABGLEICH (MW)**	Einen Gleichspannungsmesser zur Verbindung von R18 undR19 (X05-2060-10 A/7) anschließen.	–	AM(MW),MANUAL 522 kHz oder 530 kHz	L5 (X05-2060-10 A/7)	Gleichspannung für Erde: 1,0V (522 kHz) 1,1V (530 kHz)	(C)
(2)	**HF-ABGLEICH (MW)**	(D)/(B)	1400 kHz oder 1404 kHz 400 Hz, 30% mod	AM (MW) 1400 kHz ou 1404 kHz	TC1 (X05-2060-10 A/7)	Maximale Amplitude und Symmetries des Oszilloskopbildes.	
(3)	**ZF-ÜBERTRAGER**	(D)/(B)	990 kHz 400 Hz, 30% mod	AM (MW) 990 kHz	L10 (X05-2060-10 A/7	Maximale Amplitude und Symmetries des Oszilloskopbildes.	
LW-ABTEILUNG (DC-20XL)							
(4)	**HF-ABGLEICH (LW)**	Einen Gleichspannungsmesser zur Verbindung von R18 und R19 (X05-2060-72 A/7) anschließen.	–	LW, MANUAL 146 kHz	L6 (X05-2060-72 A/7)	Gleichspannung für Erde: 1,2V	
(5)	**HF-ABGLEICH (LW)**	(D)/(B)	317 kHz 400 Hz, 30% mod	LW 317 kHz	TC2 (X05-2060-72 A/7)	Maximale Amplitude und Symmetries des Oszilloskopbildes	

ADJUSTMENT (CASSETTE DECK SECTION)

1. Test Instruments, Tools and Jigs

- AC voltmeter
- Audio signal generator: AG
- Oscilloscope
- Frequency counter
- Wow and flutter meter
- Weighting filter
  (ASA A characteristic with NAB curve)
- Cassette type torque gage
- Spring balance
- Torque dial
- Head demagnetizer
- Cleaning tape (T93-0014-05)

2. Test Tapes

a) Test tapes for recording section adjustment

Normal:

Maxell XL1-S (T93-0013-15)

CrO_2:

TDK AC-512 (T93-0019-05)

Metal:

TDK AC-711 (T93-0020-05)

b) Test tapes for playback section adjustment

Tape speed and wow and flutter:

TEAC MTT-111 (T93-0015-00)

Frequency characteristic and azimuth:

TEAC MTT-216 (T93-0016-00) or

TEAC MTT-216R (T93-0017-00)

3. Notes for Adjustments

a) **Standard level:** 0 dBs = 0.775V

b) When the REC/PLAY head is replaced, its stray magnetism must be completely demagnetized by the head demagnetizer prior to loading the tape.

c) Unless otherwise designated, adjustment should be carried out with the Dolby NR switch off.

4. Meanings of Technical Words

a) Standard recording level

The recording level required to obtain the same playback level as a test tape on which a 315 Hz signal has been recorded at a magnetic flux density of 160 nWb/m.

b) Standard recording condition

The recording condition is which an input signal of 1 kHz, −8.5 dBs is applied to the AUX terminal with the input selector set to AUX and the MIC-MIXING control set to the minimum.

c) Standard input level

The input level required to obtain the standard recording level. **−8.5 dBs at the AUX terminal.**

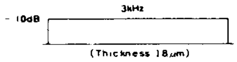
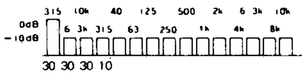
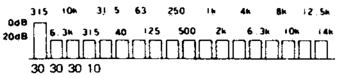
d) Standard output level

Level appearing at the junction of R89 and R91 (L) or the junction of R90 and R92 (R) of PC board X28-1410-10 when a test tape is played on which a 315 Hz signal has been recorded at a magnetic flux density of 160 nWb/m.

The output level is **−4.5 dBs** when MTT-216R 315 Hz (250 nWb/m) is played.

The output level is **−8.5 dBs** when MTT-216 315 Hz (160 nWb/m) is played.

TEST TAPE SPECIFICATIONS

MODEL	TITLE	TIME CONSTANT	DESCRIPTION		APPLICATION
			FREQ/LEVEL	PROGRAM	
MTT-111	FLUTTER	–	3 kHz −10 dB	 30 Min.	Tape Speed Test Wow and Flutter Test
MTT-216R (MTT-116R)	FREQUENCY	3180 μs and 120 μs	40 Hz∼10 kHz 0 dB/−10 dB 0 dB = DIN REFERENCE LEVEL	 315 10k 40 125 500 2k 6.3k 10k 0dB −10dB 6.3k 315 63 250 1k 4k 8k 30 30 30 10	Frequency Response Test
MTT-216 (MTT-116U)	FREQUENCY	3180 μs and 120 μs	31.5 Hz∼14 kHz 0 dB/−20 dB 0 dB = DIN REFERENCE LEVEL −4 dB	 315 10k 31.5 63 250 1k 4k 8k 12.5k 0dB −20dB 6.3k 315 40 125 500 2k 6.3k 10k 14k 30 30 30 10	Frequency Response Test

Output level of standard recorded level of 250 nWb/m is 4 dB higher than that of 160 nWb/m.

ADJUSTMENT (CASSETTE DECK SECTION)

Alignment points and input and output settings are indicated on each printed circuit board.

0 dBs = 0.775V

NO.	ITEM	TEST TAPE	INPUT SETTING	OUTPUT SETTING	CASSETTE TAPE DECK SETTING	ALIGNMENT POINTS		ALIGN FOR
						L	R	
REC/PLAY HEAD								
1	**DEMAGNETIZATION AND CLEANING**	—	—	—	POWER: OFF Remove the case.	REC/PLAY head, erase head, capstan, pinch roller, drive belt.		Demagnetize the REC/PLAY head with a head demagnetizer. Clean the REC/PLAY head, capstan and pinch roller using a cotton swab slightly damped with alcohol.
2	**AZIMUTH OF REC/PLAY HEAD**	MTT-216 (MTT-216R) 10 kHz, −20 dB	—	**(a)** Connect an AC voltmeter to the junction of R89 and R91 (L) or to the junction of R90 and R92 (R) of X28-1410-10.	Remove the case. TAPE SELECTOR: NORMAL **PLAYBACK**	REC/PLAY head azimuth adjustment screw (left screw)		Adjust the azimuth adjustment screw so that both channel output levels are maximized, then lock the screw with adhesive.
DC MOTOR								
(i)	**TAPE SPEED**	MTT-111	—	**(b)** Connect a frequency counter to the junction of R89 and R91 of X28-1410-10.	**PLAYBACK**	Trimmer potentiometer in the DC motor (for capstan drive).		Frequency: 3000 Hz
PC BOARD (X28-1410-10)								
(1)	**PLAYBACK LEVEL**	MTT-216 (MTT-216R) 315 Hz, 0 dB	—	**(a)** Connect an AC voltmeter to the jonction R89 and R91 (L) or to the junction of R90 and R92 (R) of X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: TAPE DOLBY NR: OFF **PLAYBACK**	VR1	VR2	Output level: −8.5 dBs (MTT-216) −4.5 dBs (MTT-216R)
(2)	**BIAS TRAP**	XL1-S	—	**(c)** Connect an AC voltmeter to TRAP TP (L) or to TRAP TP (R) of X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: TAPE **REC PAUSE**	L1	L2	Adjust the cores so that the output levels are minimized with the beat canceller switch set to position (A).
(3)	**RECORD LEVEL**	XL1-S	Ⓐ INPUT: AUX AG: 1 kHz, −8.5 dBs Gradually increase the AG output level to −8.5 dBs. Rapid increase may cause the ALC circuit to operate.	**(a)** Connect an AC voltmeter to the junction of R89 and R91 (L) or to the junction of R90 and R92 (R) of X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **RECORDING → PLAYBACK**	VR3	VR4	Output level: −8.5 dBs **Note:** Adjusting method If an output level of −8.5 dBs cannot be obtained, connect an ACvoltmeter to the junction between C57 and R85 (C58 and R86). For example, when the playback output level of −7.3 dBs is obtained, read the reading of the AC voltmeter with this connection during recording. Then, adjust VR3 (VR4) so that the reading of the AC voltmeter reduces by 1.2 dB Now, the playback output level is set to −8.5 dBs.
(4)	**BIAS CURRENT**	XL1-S	Ⓐ INPUT: AUX AG: 1 kHz, −28.5 dBs 10 kHz, −28.5 dBs	**(a)** Connect an AC voltmeter to the junction of R89 and R91 (L) or to the junction of R90 and R92 (R) of X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **RECORDING → PLAYBACK**	VR5	VR6	Adjust VR5 (VR6) so that the playback output level of 10 kHz is equal to that of 1 kHz.

Repeat alignments (3) and (4) several times.

REGLAGES (SECTION MAGNETOPHONE A CASSETTE)

1. Appareillages de Mesure, Outils et Gabarits

- Voltmètre CA
- Générateur audio fréquences
- Oscilloscope
- Fréquencemètre
- Fluctuomètre
- Filtre de pondération (courbe ASA A avec courbe NAB)
- Cassette de mesure de couple
- Peson
- Torsiomètre
- Démagnétiseur
- Bande de nettoyage (T93-0014-05)

2. Bandes D'essai

a) Bandes d'essai pour réglage de la section enregistrement

Normal:
Maxell XL1-S (T93-0013-15)
Chrome:
TDK AC-512 (T93-0019-05)
Métal:
TDK AC-711 (T93-0020-05)

b) Bandes d'essai pour réglage de la section lecture vitesse de défilement et pleurage et scintillement:
TEAC MTT-111 (T93-0015-00)
Réponse en fréquence et azimut:
TEAC MTT-216 (T93-0016-00) ou
TEAC MTT-216R (T93-0017-00)

3. Remarques concernant les réglages

a) **Niveau standard:** 0 dBs = 0,775V

b) Lorsque la tête de ENREGISTREMENT/LECTURE est remplacée, son magnétisme parasite doit être complètement éliminé par le démagnétiseur avant de mettre la bande magnétique en place.

c) Sauf indication contraire, les réglages doivent être effectuées réducteur de bruit Dolby hors service.

4. Significant des Termes Techniques

a) Niveau d'enregistrement standard

Niveau d'enregistrement nécessaire pour obtenir le même niveau de lecture qu'une band d'essai sur laquelle est enregistrée un signal de 315 Hz à une densité de flux magnétique de 160 nWb/m.

b) Conditions d'enregistrement standard

Conditions d'enregistrement quand un signal d'entrée de 1 kHz, −8,5 dBs est appliqué à la borne AUX le sélecteur d'entrée étant réglé sur AUX et les contrôles MIC-MIXING réglés sur le minimum.

c) Niveau d'entrée standard

Le niveau d'entrée requis pour obtenir le niveau d'enregistrement standard. **−8,5 dBs à la borne AUX.**

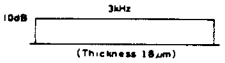
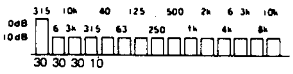
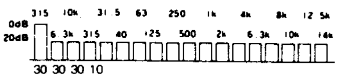
d) Niveau de sortie standard

Le niveau qui apparait à la jonction de R89 et R91 (L) ou à la jonction de R90 et R92 (R) de la plaque imprimée X28-1410-10 quand on passe une bande d'essai sur laquelle un signal de 315 Hz a été enregistré sous une densité de flux magnétique de 160 nWb/m.

Le niveau de sortie est de **−4,5 dBs** pour la lecture de MTT-216R 315 Hz (250 nWb/m).

Le niveau de sortie est de **−8,5 dBs** pour la lecture de MTT-216 315 Hz (160 nWb/m).

SPECIFICATIONS DE LA BANDE

MODELE	TITRE	CONSTANTE DE TEMPS	DESCRIPTION		APPLICATION
			FREQ./NIVEAU	PROGRAMME	
MTT-111	FLUTTER	—	3 kHz −10 dB	 30 Min.	Vitesse de défilement Pleurage et scintillement
MTT-216R (MTT-116R)	FREQUENCY	3180 μs et 120 μs	40 Hz~10 kHz 0 dB/−10 dB 0 dB = Niveau de référence DIN	 0dB 10dB 315 6.3k 10k 315 40 63 125 250 500 1k 2k 4k 6.3k 8k 10k 30 30 30 10	Réponse en fréquence Azimut
MTT-216 (MTT-116U)	FREQUENCY	3180 μs et 120 μs	31.5 Hz~14 kHz 0 dB/−20 dB 0 dB = Niveau de référence DIN −4 dB	 0dB 20dB 315 6.3k 10k 315 31.5 40 63 125 250 500 1k 2k 4k 6.3k 8k 10k 12.5k 14k 30 30 30 10	Réponse en fréquence Azimut

Le niveau de sortie du niveau enregistré de 250 nWb/m est eupérieur de 4 dB à celui de 160 nWb/m.

REGLAGES (SECTION MAGNETOPHONE A CASSETTE)

Les points de réglage et les réglages de l'entrée et de la sortie sont indiqués sur chaque plaque inprimée. 0 dBs = 0.775V

N°	ITEM	BANDE D'ESSAI	REGLAGE DE L'ENTREE	REGLAGE DE LA SORTIE	REGLAGE DU MAGNETOPHONE A CASSETTE	POINTS DE L' ALIGNEMENT		ALIGNER POUR
						G	D	
TETE DE ENREGISTREMENT/LECTURE								
1	**DEMAGNETISATION ET NETTOYAGE**	–	–	–	POWER: OFF Déplacer le caisse.	Tête de ENREGISTREMENT/ LECTURE, Tête de effacement, Cabestan, Galet-presseur, Courroie d'entraînement		Demagnittiser la tête de ENREGISTREMENT, LECTURE avec un démagnétiseur de tête. Nettoyer la tête de ENREGISTREMENT, LECTURE, la tête d'effacement, le cabestan et le galet-presseur avec un coton-tige légèrement imbibé alcool.
2	**AZIMUT DE LA TETE DE ENREGISTREMENT/ LECTURE**	MTT-216 (MIT-216R) 10 kHz, −20 dB	–	**(a)** Connecter un voltmètre CA à la jonction de R89 et R91 (gauche) ou la jonction de R90 et R92 (droite) de X28-1410-10.	Déplacer le caisse. TAPE SELECTOR NORMAL **LECTURE**	Vis d'azimut (vis de gauche)		Régler la vis d'azimut en sorte que les deux niveaux de sortie de canal soient au maximum, puis bloquer la vis avec l'adhésif.
MOTEUR CC								
(i)	**VITESSE DE DEFILEMENT**	MTT-111	–	**(b)** Connecter un compteur de fréquence à la jonction de R89 et R91 de X28-1410-10	**LECTURE**	Résistance ajustable du moteur CC (pour entraînement du cabestan)		Fréquence: 3000 Hz
PLAQUE IMPRIMEE (X28-1410-10)								
(1)	**NIVEAU DE LECTURE**	MTT-216 (MTT-216R) 315 Hz, 0 dB	–	**(a)** Connecter un voltmètre CA à la jonction de R89 et R91 (gauche) ou la jonction de R90 et R92 (droite) de X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: TAPE DOLBY NR: OFF **LECTURE**	VR1	VR2	Niveau de sortie: −8,5 dBs (MTT-216) −4,5 dBs (MTT-216R)
(2)	**REJECTEUR DE POLARISATION**	XL1-S	–	**(c)** Connecter un voltmètre CA à TRAP TP (gauche) ou TRAP TP (droite) de X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: TAPE **REC PAUSE**	L1	L2	Régler les noyaux en sorte que les niveaux de sortie soient au minimum avec le commutateur de battements (BEAT CANCELLER) réglé sur la position (A).
(3)	**NIVEAU D' ENREGISTREMENT**	XL1-S.	Ⓐ Entrée: AUX Générateur de signaux Audio: 1 kHz −8,5 dBs Elever graduellement le niveau de sorte du générateur de signaux audio jusqu'à −8,5 dBs. Une augmentation rapide pourrant actionner le circuit ALC.	**(a)** Connecter un voltmètre CA à la jonction de R89 et R91 (gauche) ou la jonction de R90 et R92 (droite) de X28-1410-10	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **ENREGISTREMENT→LECTURE**	VR3	VR4	Niveau de sortie: −8,5 dBs **Remarque:** Méthode de réglage. Si une sortie de −8,5 dBs ne peut pas être obtenue, connecter un voltmètre CA à la connexion entre C57 et R85 (C58 et R86): Par example, quand la sortie de lecture de −7,3 dBs a été obtenue, relever le niveau de lecture du voltmètre CA avec cette connexion pendant l'enregistrement. Puis régler VR3 (VR4) en sorte que la lecture du voltmètre CA soit réduite de 1,2 dB. Maintenant le niveau de sortie de lecture est réglé sur −8,5 dBs.
(4)	**COURANT DE POLARISATION**	XL1-S	Ⓐ Entrée: AUX Générateur de signaux audio: 1 kHz, −28,5 dBs 10 kHz, −28,5 dBs	**(a)** Connecter un voltmètre CA à la jonction de R89 et R91 (gauche) ou la jonction de R90 et R92 (droite) de X28-1410-10.	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **ENREGISTREMENT→LECTURE**	VR5	VR6	Régler VR5 (VR6) en sorte que le niveau de sortie de lecture de 10 kHz égale celui de 1 kHz.

Repéter les alignements (3) et (4) plusieurs fois.

ABGLEICH (KASSETTENGERÄT-ABTEILUNG)

1. Meß-und Prüfgeräte, Werkzeuge und Einspannvorrichtungen

- Wechselspannungsmesser
- NF-Signalgenerator
- Oszilloskop
- Frequenzzähler
- Gleichlauf- Schwankungsmesser
- Ohrkurven-Bewertungsfilter (ASA „A" mit NAB-Kurve)
- Kassetten-Drehmomentmesser (od. Bandzugmesser)
- Federwaage
- Drehmomentskala
- Tonkopf-Entmagnetisierungsdrossel
- Reinigungsband (T93-0014-05)

2. Bezugsbänder

a) Bezugsbänder für Abgleich von Aufnahmeteil
Normalband:
Maxell XL1-S (T93-0013-15)
CrO$_2$-Band:
TDK AC-512 (T93-0019-05)
Reineisenband:
TDK AC-711 (T93-0020-05)

b) Bezugsbänder für Abgleich von Ablesungsteil Bandgeschwindigkeit und Gleichlaufschwankungen:
TEAC MTT-111 (T93-0015-00)
Frequenzgang und Kopfazimth:
TEAC MTT-216 (T93-0016-00) oder
TEAC MTT-216R (T93-0017-00)

3. Hinweise für Abgleich

a) **Standardpegel:** 0 dBs = 0,775 Volt

b) Beim Wechseln des AUFNAHME/WIEDERGABE-Kopfes sein Störmagnetismus vollkommen mit dem Tonkopf-Entmagnetisierungsdrossel entmagnetisieren bevor das Band geladen wird.

c) Wenn nicht anders angegeben, wird der Abgleich mit dem Dolby NR Schalter auf OFF ausgeführt.

4. Bedutung der Technischen Wörter

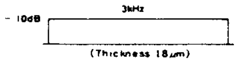
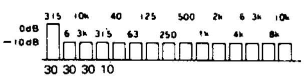
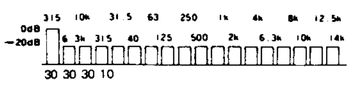
a) Normalaufnahmepegel
Der Aufnahmepegel, der erforderlich ist, um den gleichen Wiedergabepegel zu erhalten wei bei einem Bezugsband, mit dem ein 315 Hz-Signal einer Magnetflußdichte von 160 nWb/m aufgenommen wurde.

b) Bedingungen für Normalaufnahme
Die Aufnahmebedingungen bei Anlegen eines Ausgangssignal von 1 kHz, −8,5 dBs an die AUX-Klemme mit den Eingangswahlschalter auf AUX eingestellt und die MIC-MIXING Schaltung aufs Minimum.

c) Normaleingangspegel
Der Eingangspegel erforderlich um den Normalaufnahmepegel **−8,5 dBs an der AUX-Klemme** zu erhalten.

d) Normalausgangspegel
Der Pegel der an Verbindung von R89 und R91 (L) oder Verbindung von R90 und R92 (R) der gedruckte Schaltplatte X28-1410-10 erscheint wenn ein Bezugsband abgespielt wird auf dem ein Signal von 315 Hz bei einer Magnetflußdichte von 160 nWb/m aufgenommen wurde.
Der Ausgangspegel ist **−4,5 dBs**, wenn MTT-216R 315 Hz (250 nWb/m) abgespielt wird.
Der Ausgangspegel ist **−8,5 dBs**, wenn MTT-216 315 Hz (160 nWb/m) abgespielt wird.

TECHNISCHE DATEN DER BEZUGSBÄNDER

TYP	BEZEICHNUNG	ZEIT-KONSTANTE	BESCHREIBUNG		ANWENDUNG
			FREQ/PEGEL	PROGRAM	
MTT-111	Gleichlauf-schwankungen (FLUTTER)	–	3 kHz, −10 dB	 30 Min.	Bandlaufgeschwindigkeits-Prüfung Gleichlaufschwankungs-Prüfung
MTT-216R (MTT-116R)	Frequenzgang (FREQUENCY)	3180 μSek. und 120 μSek.	40 Hz∼10 kHz 0 dB/−0 dB 0 dB=DIN-Bezugspegel	 315 10k 40 125 500 2k 6.3k 10k 6.3k 31.5 63 250 1k 4k 8k 0dB −10dB 30 30 30 10	Prüfung des Frequenzgangs
MTT-216 (MTT-116U)	Frequenzgang (FREQUENCY)	3180 μSek. und 120 μSek.	315 Hz∼14 kHz 0 dB/−20 dB 0 dB=DIN-Bezugspegel −4 dB	 315 10k 31.5 63 250 1k 4k 8k 12.5k 6.3k 315 40 125 500 2k 6.3k 10k 14k 0dB −20dB 30 30 30 10	Prüfung des Frequenzgangs

Der Ausgangspegel des Normalaufnahmepegels von 250 nWb/m ist um 4 dB höher als der von 160 nWb/m.

ABGLEICH (KASSETTENGERÄT-ABTEILUNG)

Die Abgleichpunkte und Eingangs- und Ausgangs- einstellungen sind auf jeder gedruckte Schaltplatte angegeben. 0 dBs=0,775V

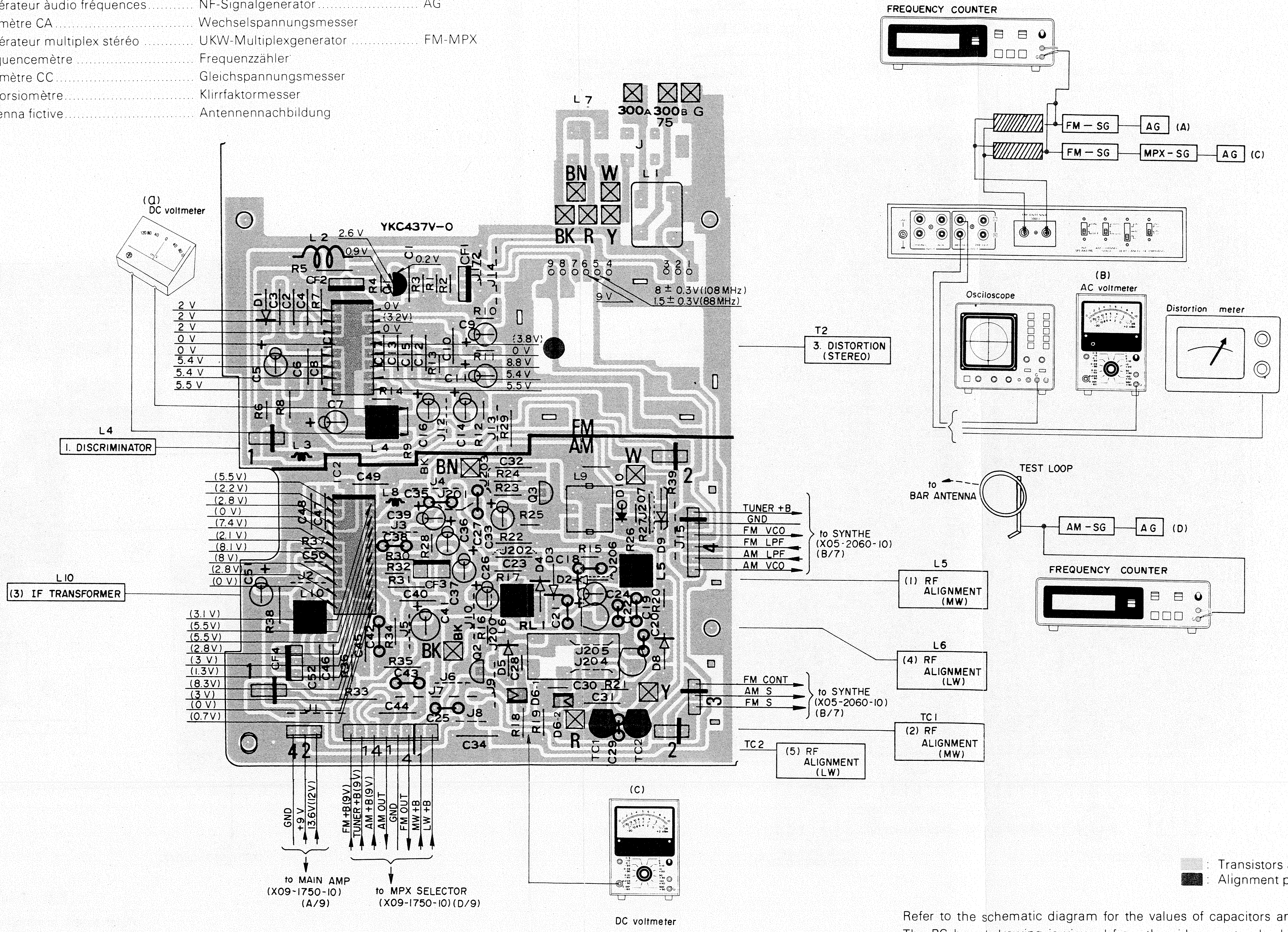
NR	GEGEN-STAND	BEZUGS BAND	EINGANGS-EINSTELLUNG	AUSGANGS-EINSTELLUNG	KASSETTEN GERÄT-EINSTELLUNG	ABGLEICH-PUNKTE		ABGLEICHEN FüR
						L	R	
AUFNAHME/WIEDERGABE-KOPF								
1	**ENTMAGNETISIERUNG UND REINIGUNG**	–	–	–	POWER: OFF Den Kasten wegbringen.	AUFNAHME/WIEDERGABE-Kopf, Löschkopf, Tonwelle, Andruckrolle, Antriebsriemen		Entmagnetisierung von dem AUFNAHME/WIEDERGABE-Kopf mit einem Tonkopf Entmagnetisierungsdrossel AUFNAHME/WIEDERGABE-Kopf, Löschkopf, Tonwelle, Andruckrolle und Antriebsriemen mit einem leicht mit Alkohol befeuchteten Wattebausch reinigen.
2	**AUFNAHME/WIEDERGABE-KOPF-AZIMUTH-EINSTELLUNG**	MTT-216 (MTT-216R) 10 kHz, −20 dB	–	**(a)** Einen Wechselspannungsmesser zur Verbindung von R89 und R91 (L) oder zur Verbindung von R90 und R92 (R) von X28-1410-10 anschließen	Den Kasten wegbringen. TAPE SELECTOR NORMAL **WIEDERGABE**	Azimuth- Einstellschraube (linke Seite)		Einstellung von Azimuth-Einstellschraube so daß beide Kanal Ausgangspegel maximal sind, dann die Schraube mit Klebstoff festlegen.
GLEICHSTROMMOTOR								
(i)	**BANDGESCHWINDIGKEIT**	MTT-111	–	**(b)** Einen Frequenzmesser zur Verbindung von R89 und R91 von X28-1410-10 anschließen.	**WIEDERGABE**	Trimmerpotentiometer am Gleichstrommotor (für Tonwellenantrieb)		Frequenz: 3000 Hz
GEDRUCKTE SCHALTPLATTE (X28-1410-10)								
(1)	**WIEDERGABE-PEGEL**	MTT-216 (MTT-216R) 315 Hz, 0 dB	–	**(a)** Einen Wechselspannungsmesser zur Verbindung von R89 und R91 (L) oder zur Verbindung von R90 nd R92 (R) von X28-1410-10 anschließen.	**TAPE SELECTOR: NORMAL** **INPUT SELECTOR: TAPE** **DOLBY NR: OFF** **WIEDERGABE**	VR1	VR2	Ausgangspegel: −8,5 dBs, (MTT-216) −4,5 dBs (MTT-216R)
(2)	**VORMAGNETISIERUNGS-SPERRE**	XL1-S	–	**(c)** Einen Wechselspannungsmesser zu TRAP TP (L) oder TRAP TP (R) von X28-1410-10 anschließen.	TAPE SELECTOR: NORMAL INPUT SELECTOR: TAPE **REC PAUSE**	L1	L2	Einstellung von Kerne so daß die Ausgangspegel minimal sind mit dem Schwebungs-Abstellknopf (BEAT CANCELLER) auf (A)
(3)	**AUFNAHME-PEGEL**	XL1-S	Ⓐ Eingang: AUX NF-Signalgenerator 1 kHz, −8,5dBs Den NF-Signalgenerator-Ausgangspegel bis auf −8,5 dBs allmälich erhöhen. Erhöhung kann Schnelle den Antrieb ALC Strom-Kreis verursachen.	**(a)** Einen Wechselspannungsmesser zur Verbindung von R89 und R91 (L) oder zur Verbindung von R90 und R92 (R) von X28-1410-10 anschließen.	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **AUFNAHME →WIEDERGABE**	VR3	VR4	Ausgangspegel: −8,5 dBs **Bemerkung:** Falls ein Ausgangspegel von −8,5 dBs nicht erhältlich ist, einen Wechselspannungsmesser an die Verbindung zwischen C57 und R85 (C58 und R16) anschließen Wenn zum Beispiel ein Uberspielausgangspegel von −7,3 dBs erhalten wurde, den Wechselspannungsmesser mit diesem Anschluß während der Aufnahme ablesen Dann VR3 (VR4) so einstellen daß die Ablesung des Wechselspannungsmessers um 1,2 dBs vermindert ist Jetzt ist der Abspielausgangspegel auf −8,5 dBs eingestellt.
(4)	**VORMAGNETISIERUNGSSTROM**	XL1-S	Ⓐ Eingang: AUX NF-Signalgenerator 1 kHz, −28,5 dBs 10 kHz, −28,5 dBs	**(a)** Einen Wechselspannungsmesser zur Verbindung von R89 und R91 (L) oder zur Verbindung von R90 und R92 (R) von X28-1410-10 anschließen.	TAPE SELECTOR: NORMAL INPUT SELECTOR: AUX MIXING VOLUME: SOURCE DOLBY NR: OFF **AUFNAHME →WIEDERGABE**	VR5	VR6	Abgleich von VR5 (VR6) so daß der Abspiel-Ausgangspegel von 10 kHz dem von 1 kHz gleich ist.

Abstimmungen (3) und (4) mehrere Male wiederholen.

PC BOARD

TUNER (X-05-2060-10) (A/7) Component Side View

TEST INSTRUMENTS	APPAREILLAGE	MEß-UND PRÜFGERÄTE	
Oscilloscope	Oscilloscope	Oszilloskop	SCOPE
AM signal generator	Générateur MA	MW-Signalgenerator	AM-SG
FM signal generator	Générateur MF	UKW-Signalgenerator	FM-SG
Audio generator	Générateur àudio fréquences	NF-Signalgenerator	AG
AC voltmeter	Voltmètre CA	Wechselspannungsmesser	
FM multiplex generator	Générateur multiplex stéréo	UKW-Multiplexgenerator	FM-MPX
Frequency counter	Fréquencemètre	Frequenzzähler	
DC voltmeter	Voltmètre CC	Gleichspannungsmesser	
Distortion meter	Distorsiomètre	Klirrfaktormesser	
Dummy antenna	Antenna fictive	Antennennachbildung	


FREQUENCY COUNTER
FM – SG
AG (A)
FM – SG
MPX – SG
AG (C)
(B) AC voltmeter
Oscilloscope
Distortion meter
(a) DC voltmeter
YKC437V-0
L7
300A 300B G
75
J
BN W
L1
BK R Y
9 8 7 6 5 4 3 2 1
9 V
8 ± 0.3V(108 MHz)
1.5 ± 0.3V(88 MHz)
T2
3. DISTORTION (STEREO)
L4
1. DISCRIMINATOR
L10
(3) IF TRANSFORMER
2.6 V
0.9V
0.2 V
0 V
(3.2V)
(3.8V)
0 V
8.8 V
5.4 V
5.5 V
2 V
2 V
2 V
0 V
0 V
5.4 V
5.4 V
5.5 V
(5.5 V)
(2.2 V)
(2.8 V)
(0 V)
(7.4 V)
(2.1 V)
(8.1 V)
(8 V)
(2.8 V)
(0 V)
(3.1 V)
(5.5 V)
(5.5 V)
(2.8 V)
(3 V)
(1.3 V)
(8.3 V)
(3 V)
(0 V)
(0.7 V)
FM
AM
TUNER +B
GND
FM VCO
FM LPF
AM LPF
AM VCO
to SYNTHE (X05-2060-10) (B/7)
FM CONT
AM S
FM S
to SYNTHE (X05-2060-10) (B/7)
TEST LOOP
to BAR ANTENNA
AM – SG
AG (D)
FREQUENCY COUNTER
L5
(1) RF ALIGNMENT (MW)
L6
(4) RF ALIGNMENT (LW)
TC1
(2) RF ALIGNMENT (MW)
TC2
(5) RF ALIGNMENT (LW)
(C)
DC voltmeter
GND
+9 V
13.6V(12V)
FM +B(9V)
TUNER +B(9V)
AM +B(9V)
AM OUT
GND
FM OUT
MW +B
LW +B
to MAIN AMP (X09-1750-10) (A/9)
to MPX SELECTOR (X09-1750-10) (D/9)

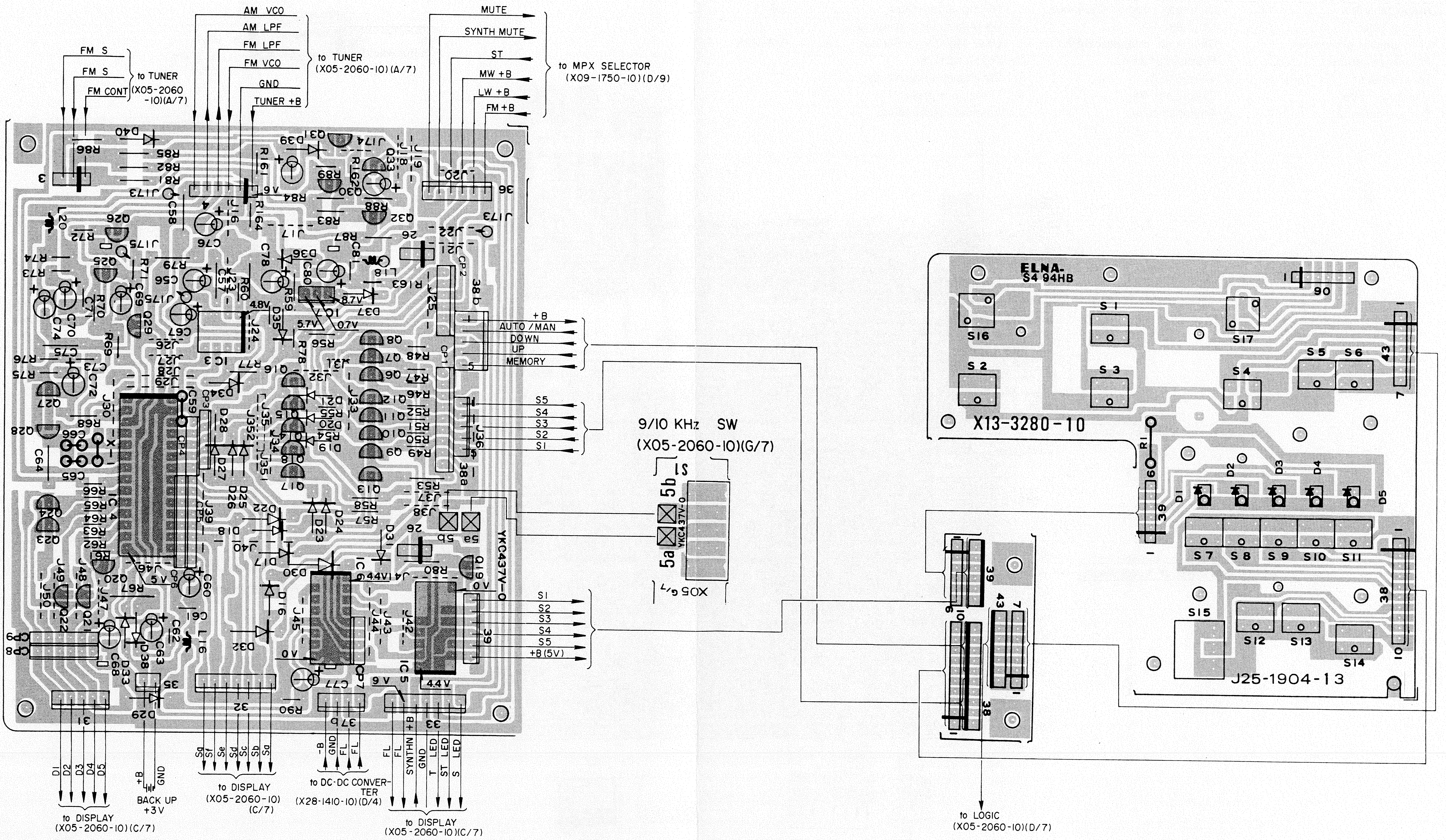
▨ : Transistors and ICs
■ : Alignment points

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD

SYNTHE
(X05-2060-10) (B/7)
Component Side View

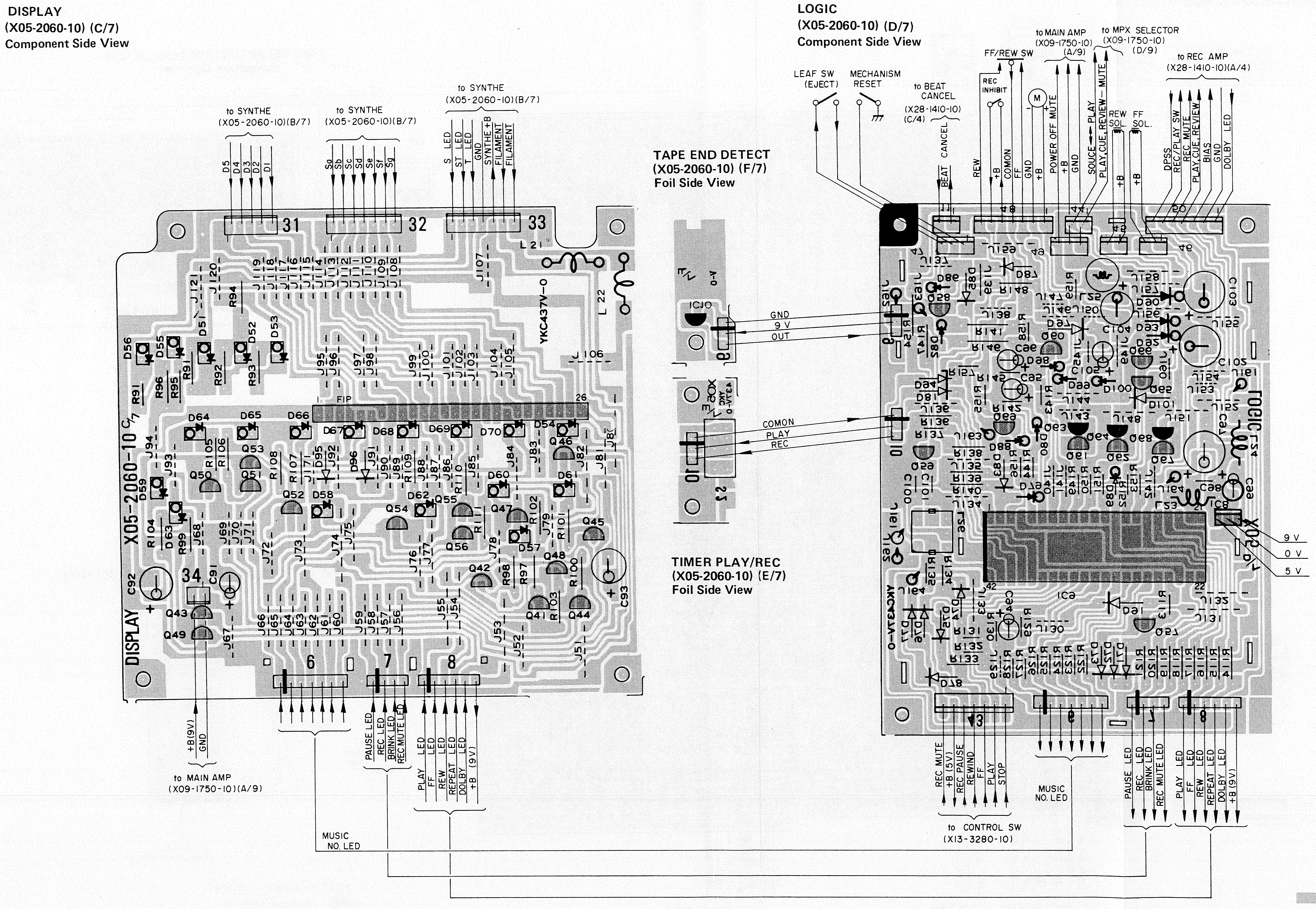
CONROL SW
(X13-3280-10)
Componet Side View


FM S
FM S
FM CONT
to TUNER (X05-2060-10)(A/7)
AM VCO
AM LPF
FM LPF
FM VCO
GND
TUNER +B
to TUNER (X05-2060-10) (A/7)
MUTE
SYNTH MUTE
ST
MW +B
LW +B
FM +B
to MPX SELECTOR (X09-1750-10)(D/9)
+B
AUTO / MAN
DOWN
UP
MEMORY
S5
S4
S3
S2
S1
9/10 KHz SW
(X05-2060-10)(G/7)
S1
5a
5b
YKC437V-0
X05 G/7
S1
S2
S3
S4
S5
+B (5V)
D1
D2
D3
D4
D5
to DISPLAY (X05-2060-10)(C/7)
+B
GND
BACK UP +3V
Sg
Sf
Se
Sd
Sc
Sb
Sa
to DISPLAY (X05-2060-10) (C/7)
-B
GND
FL
FL
to DC-DC CONVERTER (X28-1410-10)(D/4)
FL
FL
SYNTHN +B
GND
T LED
ST LED
S LED
S
to DISPLAY (X05-2060-10)(C/7)
ELNA-S4 94HB
X13-3280-10
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
D1
D2
D3
D4
D5
R1
J25-1904-13
to LOGIC (X05-2060-10)(D/7)

▨: Transistors and ICs

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD



DISPLAY
(X05-2060-10) (C/7)
Component Side View

TAPE END DETECT
(X05-2060-10) (F/7)
Foil Side View

TIMER PLAY/REC
(X05-2060-10) (E/7)
Foil Side View

LOGIC
(X05-2060-10) (D/7)
Component Side View

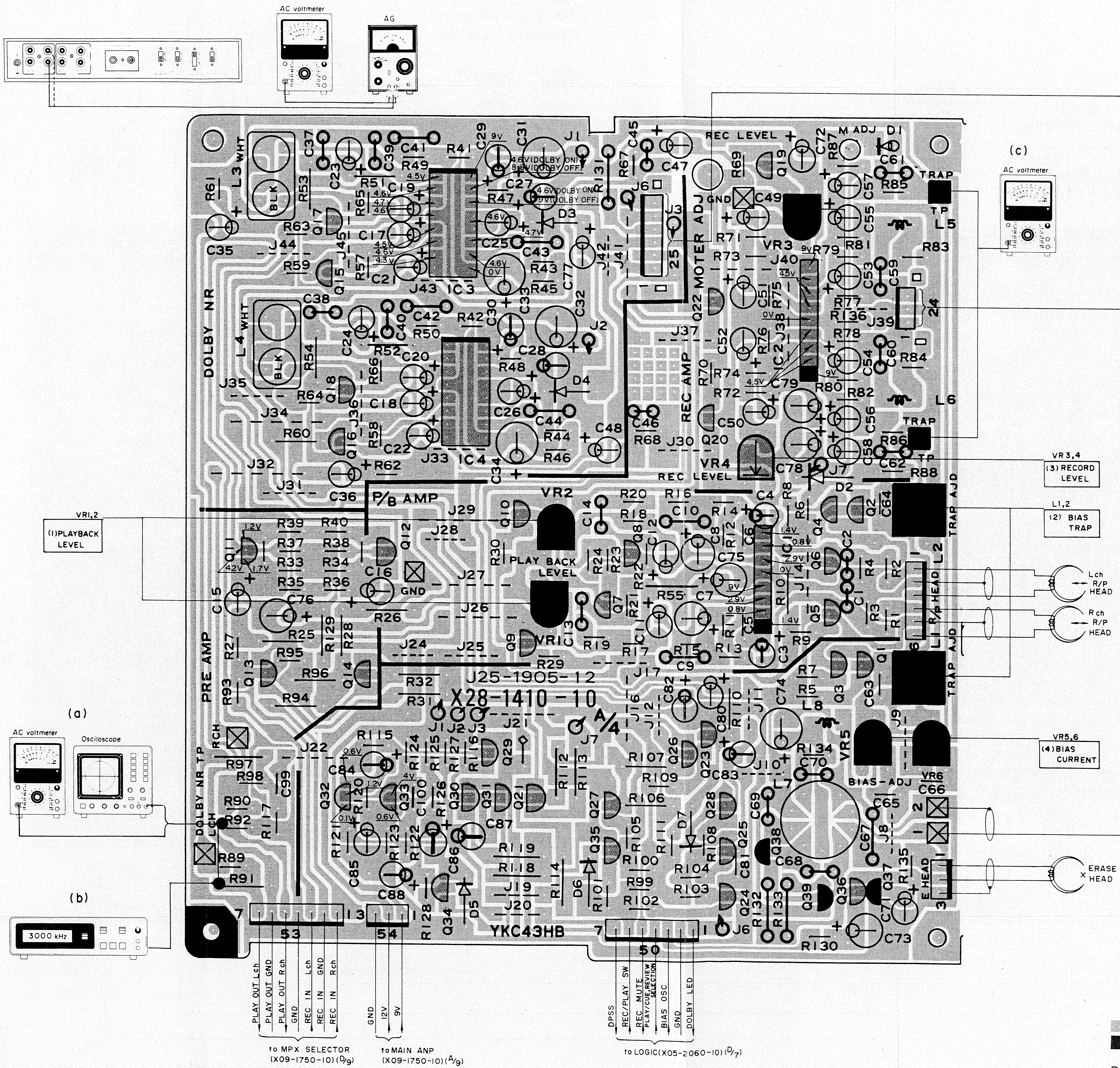
to SYNTHE (X05-2060-10)(B/7)
D5 D4 D3 D2 D1
to SYNTHE (X05-2060-10)(B/7)
Sa Sb Sc Sd Se Sf Sg
to SYNTHE (X05-2060-10)(B/7)
S LED ST LED T LED GND SYNTHE+B FILAMENT FILAMENT
31
32
33
L21
L22
YKC437V-O
FIP
26
X05-2060-10 C/7
DISPLAY
34
C91 C92 C93
6
7
8
+B(9V) GND
to MAIN AMP (X09-1750-10)(A/9)
PAUSE LED REC LED BRINK LED REC MUTE LED
PLAY LED FF LED REW LED REPEAT LED DOLBY LED +B (9V)
MUSIC NO. LED
GND
9 V
OUT
COMON
PLAY
REC
LEAF SW (EJECT)
MECHANISM RESET
to BEAT CANCEL (X28-1410-10) (C/4)
BEAT CANCEL
FF/REW SW
REC INHIBIT
REW +B COMON FF GND +B
to MAIN AMP (X09-1750-10) (A/9)
POWER OFF MUTE +B GND
to MPX SELECTOR (X09-1750-10) (D/9)
SOUCE ←→ PLAY
PLAY,CUE, REVIEW←MUTE
REW SOL.
FF SOL.
+B
+B
to REC AMP (X28-1410-10)(A/4)
DPSS REC/PLAY SW REC MUTE PLAY,CUE, REVIEW BIAS GND DOLBY LED
LOGIC
IC8
IC9
9 V
0 V
5 V
REC MUTE +B (5V) REC PAUSE REWIND FF PLAY STOP
to CONTROL SW (X13-3280-10)
MUSIC NO. LED
PAUSE LED REC LED BRINK LED REC MUTE LED
PLAY LED FF LED REW LED REPEAT LED DOLBY LED +B (9V)

▨: Transistors and ICs

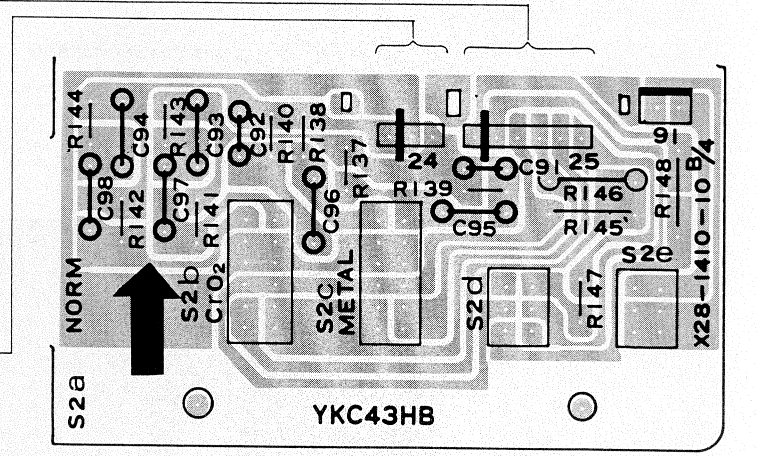
Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD

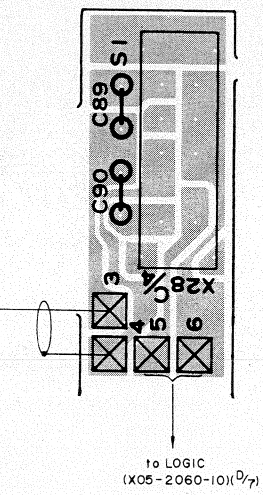
REC AMP (X28-1410-10) (A/4) Component Side View


AC voltmeter
AG
(a)
AC voltmeter
Oscilloscope
(b)
3000 kHz
(c)
AC voltmeter
VR1,2
(1)PLAYBACK LEVEL
VR3,4
(3) RECORD LEVEL
L1,2
(2) BIAS TRAP
VR5,6
(4)BIAS CURRENT
Lch R/P HEAD
Rch R/P HEAD
ERASE HEAD
DOLBY NR
PRE AMP
P/B AMP
REC AMP
MOTER ADJ
REC LEVEL
PLAY BACK LEVEL
TRAP
TP
TRAP AJD
BIAS-ADJ
E HEAD
X28-1410-10 A/4
J25-1905-12
YKC43HB
IC3
IC4
53
54
50
PLAY OUT Lch
PLAY OUT GND
PLAY OUT Rch
GND
REC IN Lch
GND
REC IN Rch
GND
12V
9V
DPSS
REC/PLAY SW
REC MUTE
PLAY/CUE/REVIEW SELECTOR
BIAS OSC
GND
DOLBY LED
to MPX SELECTOR (X09-1750-10)(D/9)
to MAIN ANP (X09-1750-10)(A/9)
to LOGIC(X05-2060-10)(D/7)

TAPE SELECTOR (X28-1410-10) (B/4)
Component Side View


NORM
S2a
S2b CrO2
S2c METAL
S2d
S2e
YKC43HB
X28-1410-10 B/4

BEAT CANCEL (X28-1410-10) (C/4)
Component Side View

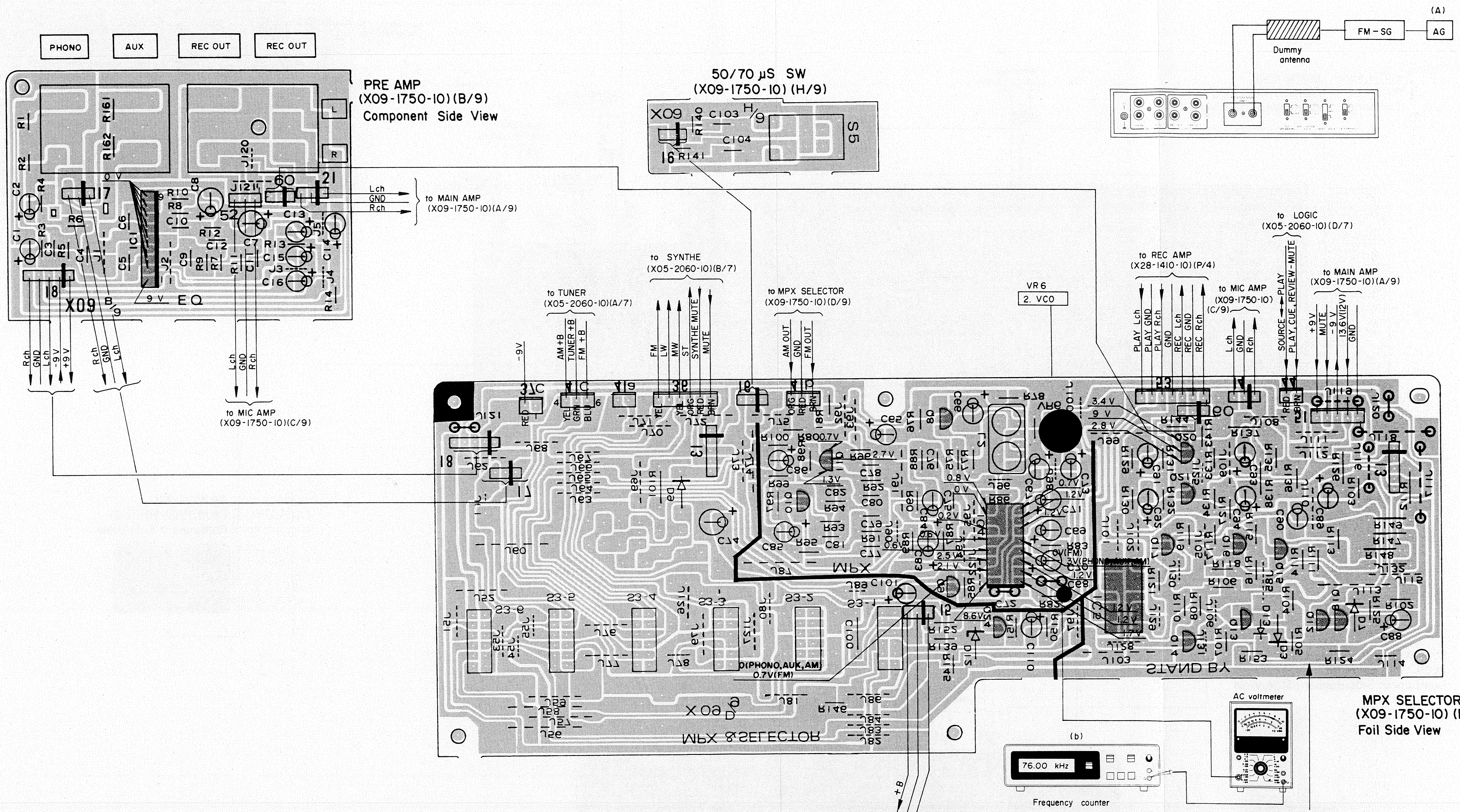

S1
C89
C90
X28 C/4
to LOGIC (X05-2060-10)(D/7)

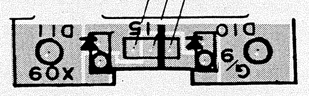
▨ : Transistor and ICs

■ : Alignment points

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD


PHONO
AUX
REC OUT
REC OUT
PRE AMP
(X09-1750-10)(B/9)
Component Side View
Lch
GND
Rch
to MAIN AMP
(X09-1750-10)(A/9)
9 V EQ
X09 B/9
Rch GND Lch -9V +9V
Rch GND Lch
Lch GND Rch
to MIC AMP
(X09-1750-10)(C/9)
50/70 µS SW
(X09-1750-10)(H/9)
(A)
FM-SG
AG
Dummy antenna
to TUNER
(X05-2060-10)(A/7)
AM+B
TUNER+B
FM+B
-9V
to SYNTHE
(X05-2060-10)(B/7)
FM
LW
MW
ST
SYNTHE MUTE
MUTE
to MPX SELECTOR
(X09-1750-10)(D/9)
AM OUT
GND
FM OUT
VR6
2. VCO
to REC AMP
(X28-1410-10)(P/4)
PLAY Lch
PLAY GND
PLAY Rch
GND
REC Lch
REC GND
REC Rch
to MIC AMP
(X09-1750-10)
(C/9)
Lch
GND
Rch
to LOGIC
(X05-2060-10)(D/7)
SOURCE→PLAY
PLAY,CUE,REVIEW-MUTE
to MAIN AMP
(X09-1750-10)(A/9)
+9V
MUTE
-9V
13.6V(12V)
GND
3.4V
9V
2.8V
0(PHONO,AUX,AM)
0.7V(FM)
MPX
STAND BY
MPX & SELECTOR
X09 D/9
+B
(b)
76.00 kHz
Frequency counter
AC voltmeter
MPX SELECTOR
(X09-1750-10) (D/9)
Foil Side View


D11
D10
X09 G/9

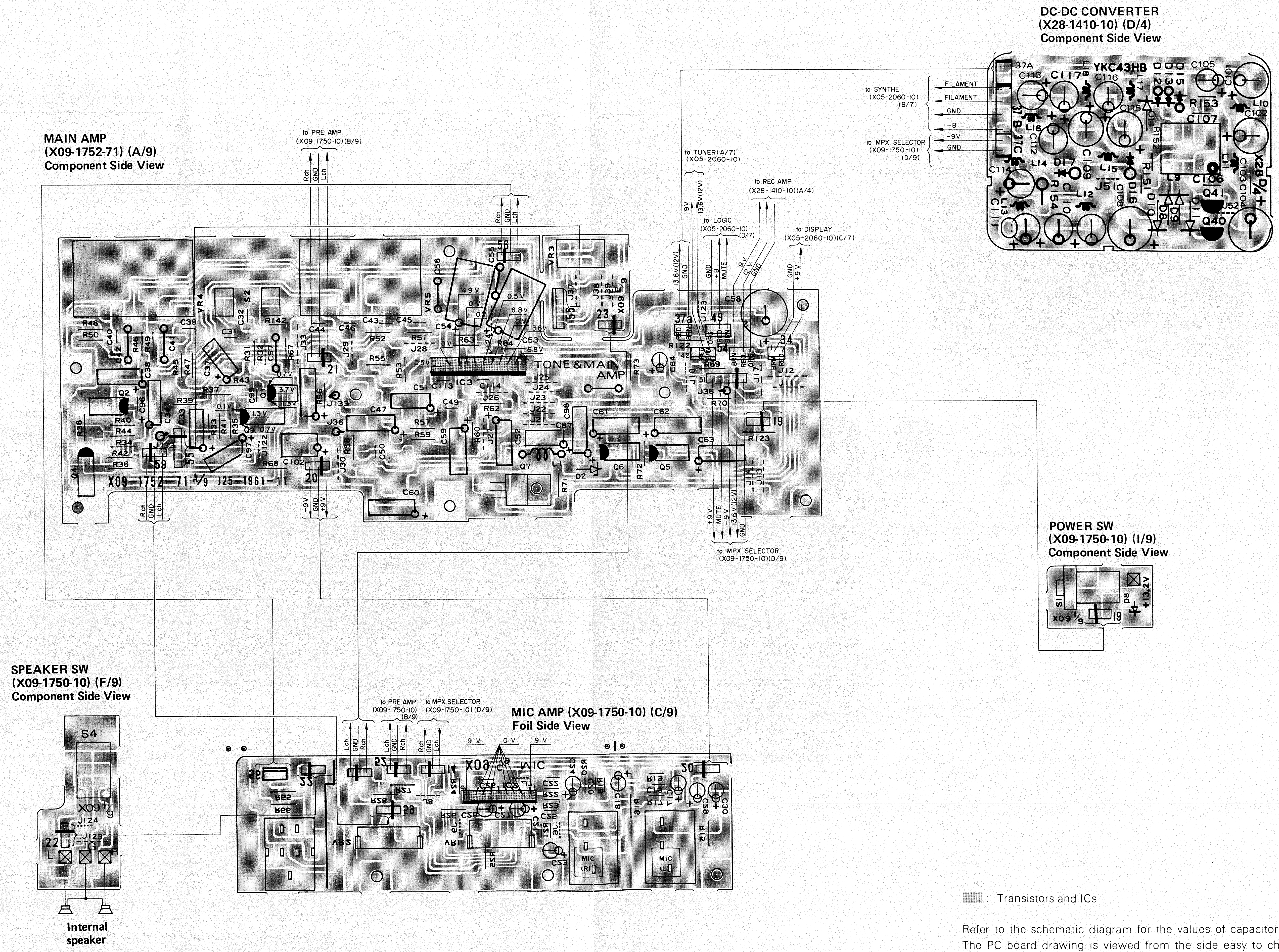
TIMER STANDBY LED
(X09-1750-10)(G/9)

	PLAY	PHONO, AUX, AM
Q12	OFF	OFF
Q13	ON	OFF
Q14	ON	OFF
Q15	ON	OFF
Q16	OFF	ON
Q17	OFF	ON

▒ : Transistors and ICs
■ : Alignment points

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD

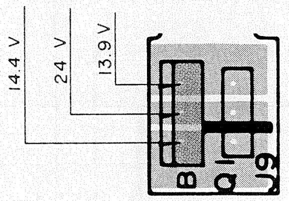

DC-DC CONVERTER
(X28-1410-10) (D/4)
Component Side View
YKC43HB
to SYNTHE (X05-2060-10) (B/7)
FILAMENT
FILAMENT
GND
-8
to MPX SELECTOR (X09-1750-10) (D/9)
-9V
GND
MAIN AMP
(X09-1752-71) (A/9)
Component Side View
to PRE AMP (X09-1750-10) (B/9)
Rch
GND
Lch
to TUNER (A/7) (X05-2060-10)
9V
13.6V(12V)
to REC AMP (X28-1410-10) (A/4)
to LOGIC (X05-2060-10) (D/7)
to DISPLAY (X05-2060-10) (C/7)
GND
+B
MUTE
9V
12V
GND
+9V
TONE & MAIN AMP
IC3
X09-1752-71 A/9 J25-1961-11
-9V
GND
+9V
+9V
MUTE
9V
13.6V(12V)
GND
to MPX SELECTOR (X09-1750-10) (D/9)
POWER SW
(X09-1750-10) (I/9)
Component Side View
S1
D8
+13.2V
X09 I/9
19
SPEAKER SW
(X09-1750-10) (F/9)
Component Side View
S4
X09 F/9
J124
J123
22
L
G
R
Internal speaker
to PRE AMP (X09-1750-10) (B/9)
to MPX SELECTOR (X09-1750-10) (D/9)
MIC AMP (X09-1750-10) (C/9)
Foil Side View
9V
0V
9V
X09
MIC
VR1
VR2
MIC (R)
MIC (L)

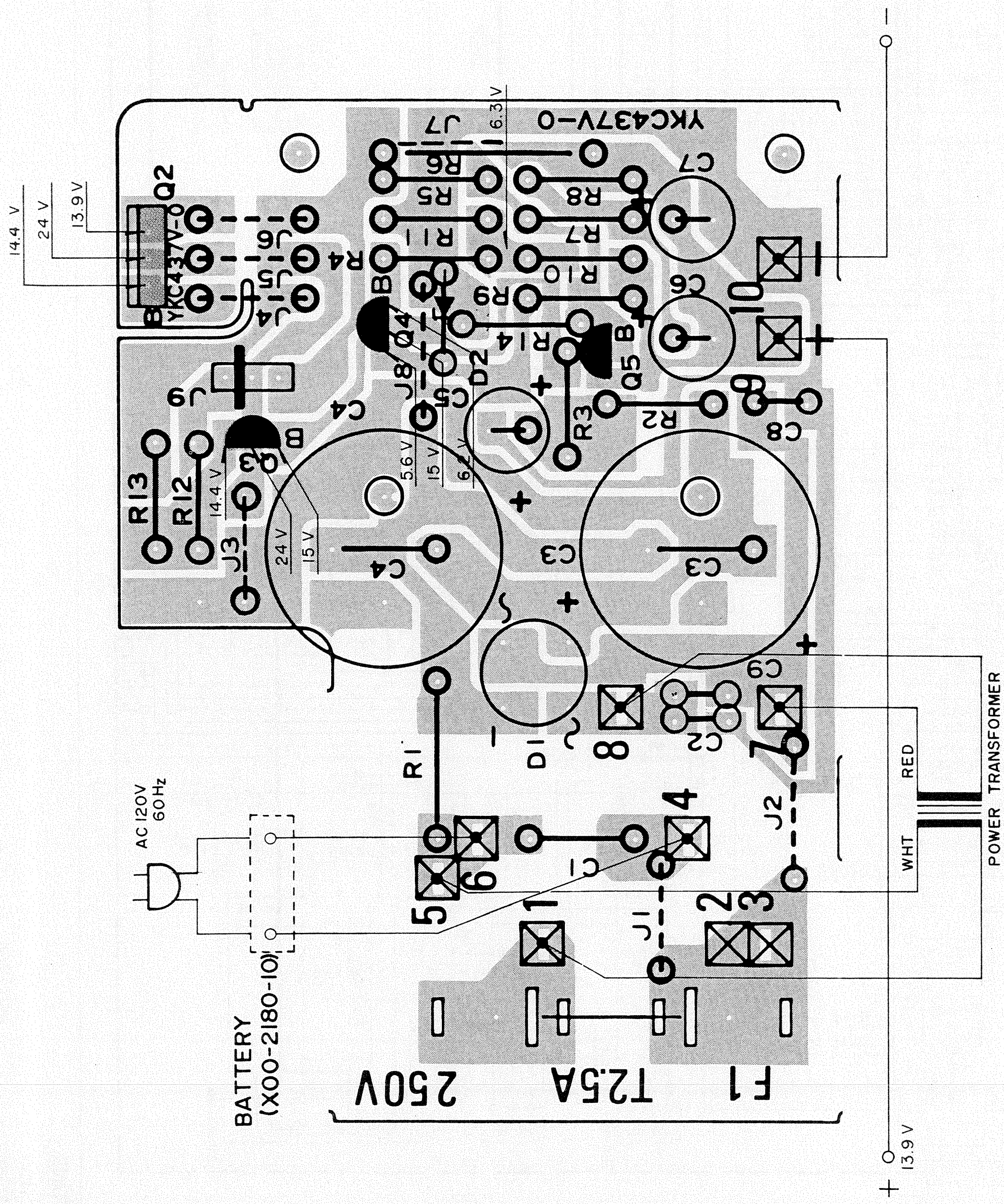
▨ : Transistors and ICs

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

PC BOARD

AD-12
BATTERY (X00-2180-10)
Component Side View

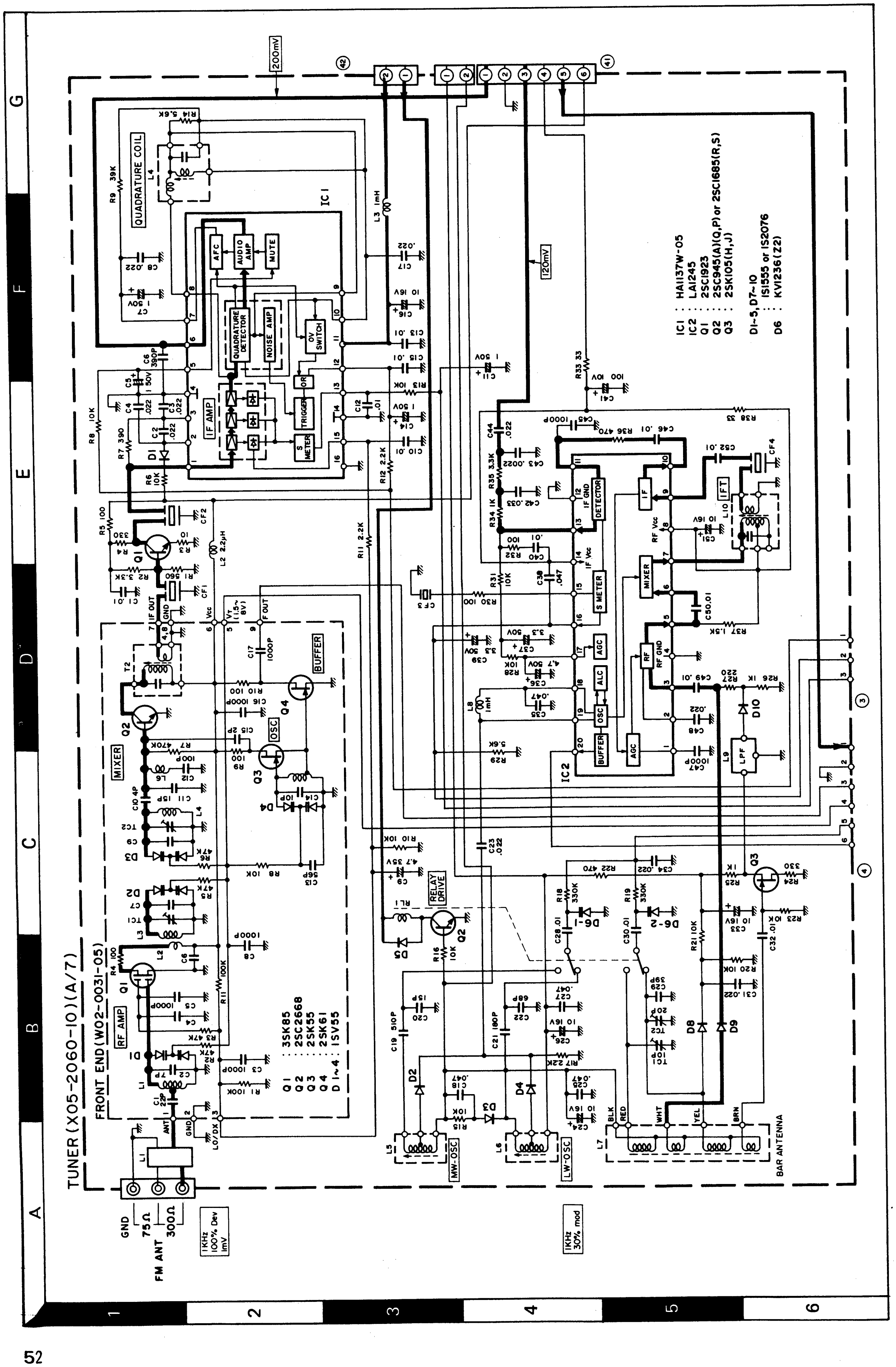

14.4 V
24 V
13.9 V
B
Q1
J9


Q2
YKC437V-0
14.4 V
24 V
13.9 V
B
J4
J5
J6
J7
6.3 V
YKC437V-O
R6
R5
R11
R4
R8
R7
R10
R9
C7
C6
10
9
B
Q4
D2
R14
Q5
B
J8
C5
C4
R3
R2
C8
J9
R13
R12
Q3
B
14.4 V
5.6 V
15 V
6.2 V
24 V
15 V
J3
C4
C3
C3
+
−
D1
8
C9
C2
7
R1
J2
4
C1
6
5
1
J1
2
3
AC 120V
60Hz
BATTERY
(X00-2180-10)
F1
T2.5A
250V
RED
WHT
POWER TRANSFORMER
−
+
13.9 V

■: Transistors and ICs

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

KENWOOD® DC-20XL


TUNER (X05-2060-10) (A/7)
FRONT END (W02-0031-05)
Q1 : 3SK85
Q2 : 2SC2668
Q3 : 2SK55
Q4 : 2SK61
D1~4 : 1SV55
RF AMP
MIXER
OSC
BUFFER
IC1
IC2
IC1 : HA1137W-05
IC2 : LA1245
Q1 : 2SC1923
Q2 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q3 : 2SK105(H,J)
D1~5, D7~10 : 1S1555 or 1S2076
D6 : KV1236(Z2)
QUADRATURE COIL
IF AMP
QUADRATURE DETECTOR
NOISE AMP
AUDIO AMP
AFC
MUTE
S METER
TRIGGER
OV SWITCH
RELAY DRIVE
MW-OSC
LW-OSC
BAR ANTENNA
BLK
RED
WHT
YEL
BRN
LPF
IFT
FM ANT
GND
75Ω
300Ω
1KHz 100% Dev 1mV
1KHz 30% mod
200mV
120mV
A
B
C
D
E
F
G
1
2
3
4
5
6

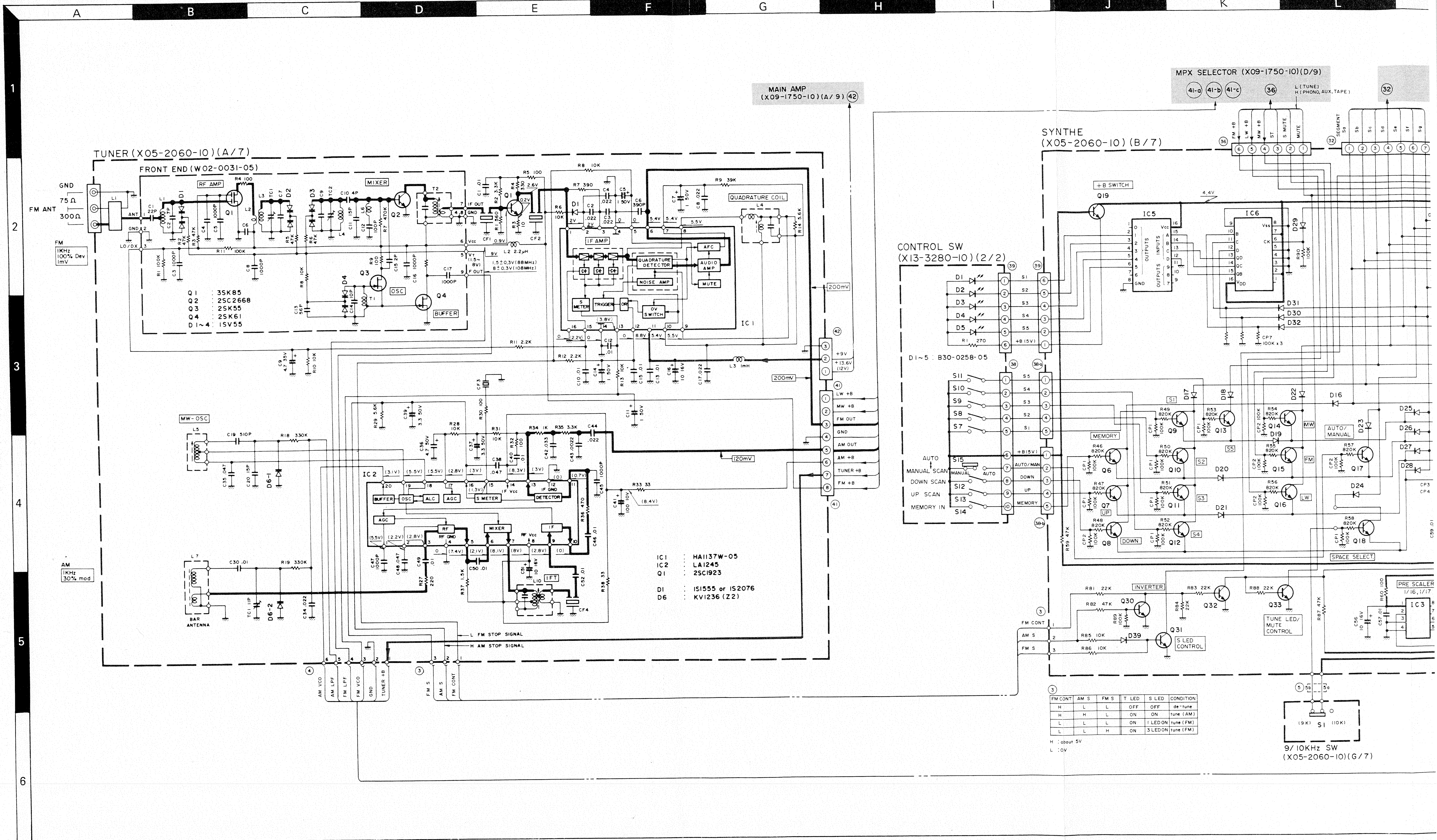
SPECIFICATIONS

LW TUNER SECTION

Sensitivity S/N 20 dB	850 µV/m
S/N Ratio: 1 mV Input	43 dB
Image Rejection Ratio	60 dB

KENWOOD®

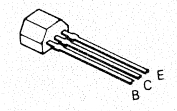
STEREO DECK AMPLI-TUNER

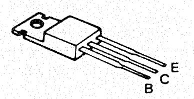

A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
MAIN AMP (X09-1750-10)(A/9) 42
MPX SELECTOR (X09-1750-10)(D/9)
41-a
41-b
41-c
36
32
L (TUNE) H (PHONO, AUX, TAPE)
TUNER (X05-2060-10)(A/7)
FRONT END (W02-0031-05)
SYNTHE (X05-2060-10)(B/7)
CONTROL SW (X13-3280-10)(2/2)
GND
FM ANT
75Ω
300Ω
FM 1KHz 100% Dev 1mV
RF AMP
MIXER
OSC
BUFFER
Q1 : 3SK85
Q2 : 2SC2668
Q3 : 2SK55
Q4 : 2SK61
D1~4 : 1SV55
IF OUT
QUADRATURE COIL
IF AMP
QUADRATURE DETECTOR
AUDIO AMP
AFC
MUTE
NOISE AMP
S METER
TRIGGER
0V SWITCH
IC1
200mV
120mV
+9V
+13.6V (12V)
LW +B
MW +B
FM OUT
GND
AM OUT
AM +B
TUNER +B
FM +B
MW-OSC
AM 1KHz 30% mod
BAR ANTENNA
IC2
BUFFER
OSC
ALC
AGC
S METER
DETECTOR
RF
MIXER
IF
IFT
IC1 : HA1137W-05
IC2 : LA1245
Q1 : 2SC1923
D1 D6 : 1S1555 or 1S2076
KV1236 (Z2)
L FM STOP SIGNAL
H AM STOP SIGNAL
AM VCO
AM LPF
FM LPF
FM VCO
GND
TUNER +B
FM S
AM S
FM CONT
+B SWITCH
Q19
IC5
IC6
D1~5 : B30-0258-05
S11
S10
S9
S8
S7
AUTO
MANUAL SCAN
DOWN SCAN
UP SCAN
MEMORY IN
S15
S12
S13
S14
MEMORY
UP
DOWN
AUTO/MANUAL
MW
FM
LW
SPACE SELECT
INVERTER
Q30
Q31
Q32
Q33
S LED CONTROL
TUNE LED/MUTE CONTROL
PRE SCALER 1/16, 1/17
IC3
FM CONT
AM S
FM S
9/10KHz SW (X05-2060-10)(G/7)
(9K) S1 (10K)

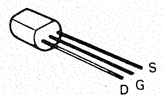
③

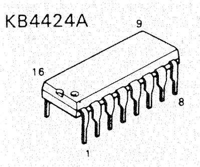
FM CONT	AM S	FM S	T LED	S LED	CONDITION
H	L	L	OFF	OFF	de-tune
H	H	L	ON	ON	tune (AM)
L	L	L	ON	1 LED ON	tune (FM)
L	L	H	ON	3 LED ON	tune (FM)

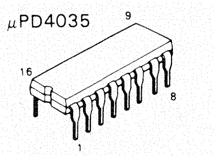
H : about 5V
L : 0V

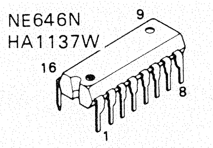
2SC2668


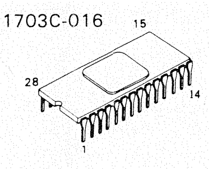
2SD313T-AL (E)
2SD330 (E,F)


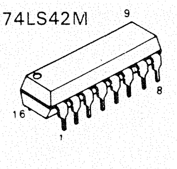
2SK105 (H,J)


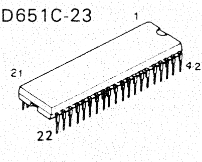
KB4424A


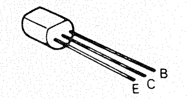
μPD4035


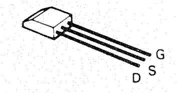
NE646N
HA1137W


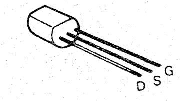
μPD1703C-016


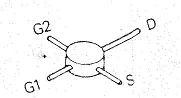
MB74LS42M


μPD651C-23


2SA1127NC PR,S)
2SA733 (A) (Q,P)
2SA992 (F,E)
2SC2378 (Q,P,K)
2SC945 (A)
2SC1685 (R,S)
2SC1384 (Q,R)
2SC1845 (F,E)
2SD592NC (Q,R,S)


2SK55 (E)


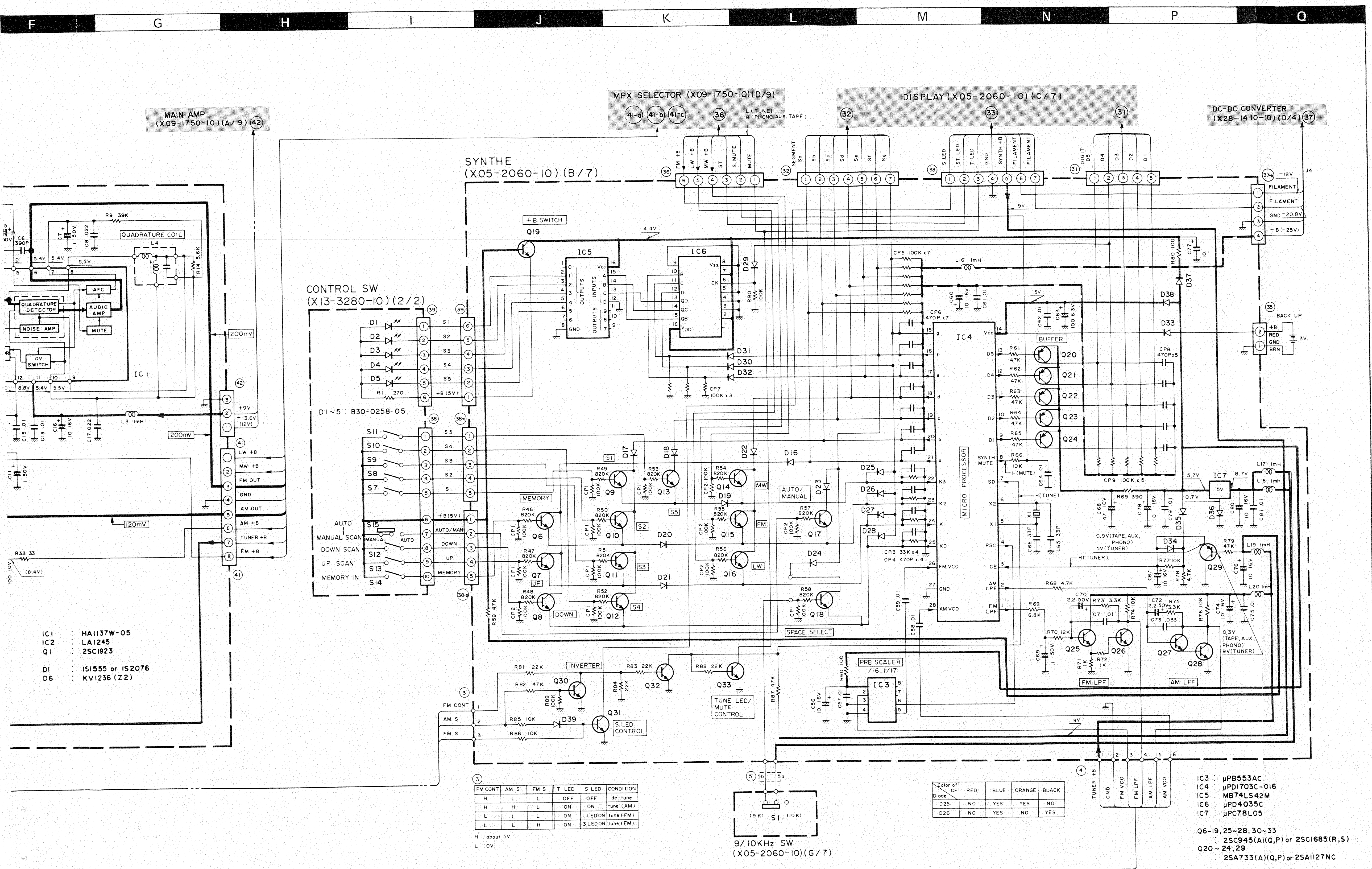
2SK61 (Y)


3SK85


STEREO DECK AMPLI-TUNER

DC-20X

C-60
KENWOOD


F
G
H
I
J
K
L
M
N
P
Q
MAIN AMP (X09-1750-10)(A/9) 42
MPX SELECTOR (X09-1750-10)(D/9)
41-a
41-b
41-c
36
L (TUNE)
H (PHONO, AUX, TAPE)
DISPLAY (X05-2060-10)(C/7)
32
33
31
DC-DC CONVERTER (X28-1410-10)(D/4)
37
SYNTHE (X05-2060-10)(B/7)
CONTROL SW (X13-3280-10)(2/2)
QUADRATURE COIL
QUADRATURE DETECTOR
AUDIO AMP
AFC
MUTE
NOISE AMP
OV SWITCH
IC1
+B SWITCH
Q19
IC5
IC6
IC4
MICRO PROCESSOR
BUFFER
Q20
Q21
Q22
Q23
Q24
IC7
BACK UP
FILAMENT
GND
-B (-25V)
-18V
D1~5 : B30-0258-05
AUTO
MANUAL SCAN
DOWN SCAN
UP SCAN
MEMORY IN
MEMORY
UP
DOWN
AUTO/MANUAL
FM
MW
LW
SPACE SELECT
INVERTER
Q30
Q31
Q32
Q33
S LED CONTROL
TUNE LED/MUTE CONTROL
PRE SCALER 1/16, 1/17
IC3
FM LPF
AM LPF
FM CONT
AM S
FM S
TUNER +B
GND
FM VCO
FM LPF
AM LPF
AM VCO
9/10KHz SW (X05-2060-10)(G/7)
(9K) S1 (10K)
200mV
120mV
+9V
+13.6V (12V)
LW +B
MW +B
FM OUT
AM OUT
AM +B
TUNER +B
FM +B

IC1 : HA1137W-05
IC2 : LA1245
Q1 : 2SC1923

D1 : 1S1555 or 1S2076
D6 : KV1236 (Z2)

③

FM CONT	AM S	FM S	T LED	S LED	CONDITION
H	L	L	OFF	OFF	de-tune
H	H	L	ON	ON	tune (AM)
L	L	L	ON	1 LED ON	tune (FM)
L	L	H	ON	3 LED ON	tune (FM)

H : about 5V
L : 0V

Color of CF / Diode	RED	BLUE	ORANGE	BLACK
D25	NO	YES	YES	NO
D26	NO	YES	NO	YES

IC3 : μPB553AC
IC4 : μPD1703C-016
IC5 : MB74LS42M
IC6 : μPD4035C
IC7 : μPC78L05

Q6~19, 25~28, 30~33
: 2SC945(A)(Q,P) or 2SC1685(R,S)
Q20~24, 29
: 2SA733(A)(Q,P) or 2SA1127NC

D16~39
: 1S1555 or 1S2076

SPECIFICATIONS

FM TUNER SECTION

Usable Sensitivity (300Ω)	13.2 dBf (2.5 μV)
50 dB Quieting Sensitivity	
Mono	17.7 dBf (4.2 μV)
Stereo	40 dBf (55 μV)
Signal-to-Noise Ratio at 65 dBf	
Mono	67 dB
Stereo	62 dB
Total Harmonic Distortion at 1,000 Hz	
Mono	0.4%
Stereo	0.5%
Frequency Response	30 Hz to 15 kHz +0.5 dB, −1.5 dB
Capture Ratio	1 dB
Image Rejection Ratio	78 dB
IF Response Ratio	90 dB
Alternate Channel Selectivity	55 dB at 400 kHz
Stereo Separation Ratio	36 dB at 1,000 Hz 30 dB at 50 Hz to 10 kHz
Antenne Impedance	300 ohms balanced
FM Frequency Range	87.5 MHz to 108 MHz

AM TUNER SECTION

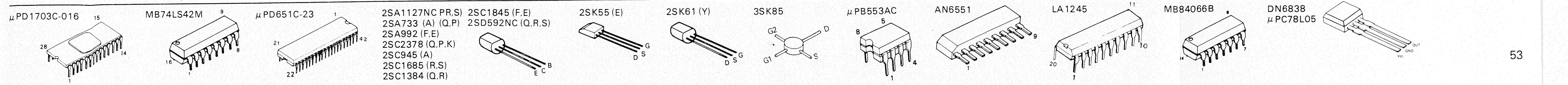
Usable Sensitivity	700 μV/m
Signal-to-Noise Ratio	45 dB
Image Rejection	40 dB
Selectivity	35 dB
AM Frequency Range	530 kHz ~ 1620 kHz

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

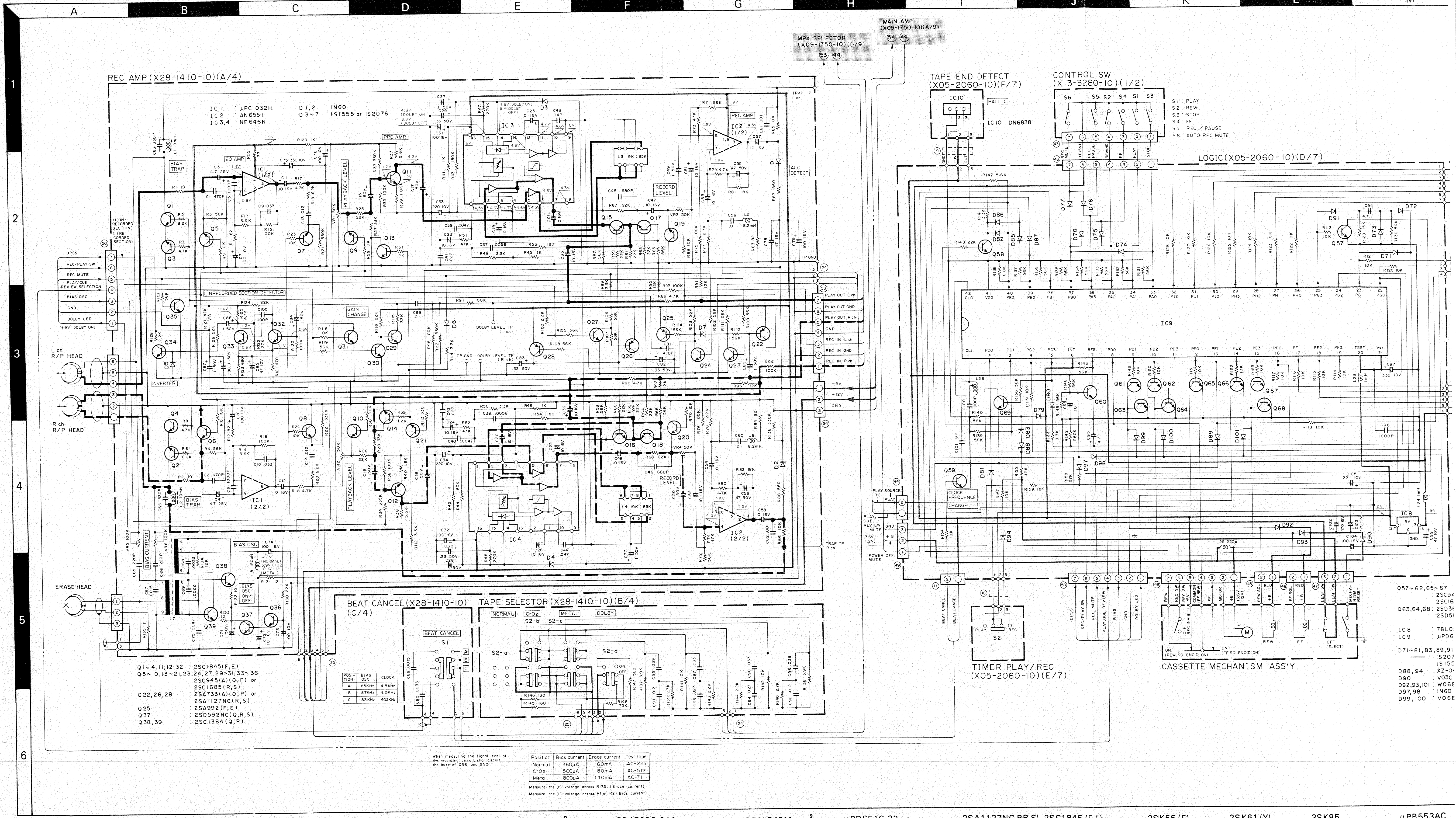
Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

- DC voltages are measured by a VOM of 20 kΩ/V input impedance.
- Les tensions de courant continu sont measurées par un multimétre d'une impédance d'entrée de 20 kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20 kΩ/V Eingangs-Impedanz gemessen.


μPD1703C-016
15
28
14
1
MB74LS42M
9
16
8
1
μPD651C-23
1
21
42
22
2SA1127NC PR,S)
2SA733 (A) (Q,P)
2SA992 (F,E)
2SC2378 (Q,P,K)
2SC945 (A)
2SC1685 (R,S)
2SC1384 (Q,R)
2SC1845 (F,E)
2SD592NC (Q,R,S)
E
C
B
2SK55 (E)
D
S
G
2SK61 (Y)
D
S
G
3SK85
G2
D
G1
S
μPB553AC
5
8
4
1
AN6551
9
1
LA1245
11
10
20
1
MB84066B
8
14
7
1
DN6838
μPC78L05
OUT
GND
Vcc

KENWOOD®

STEREO DECK AMPLI-TUNER

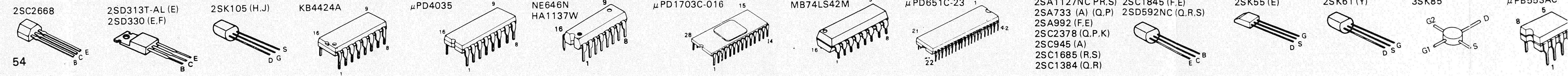

A B C D E F G H I J K L M
1 2 3 4 5 6
MPX SELECTOR (X09-1750-10)(D/9)
MAIN AMP (X09-1750-10)(A/9)
REC AMP (X28-1410-10)(A/4)
IC1 : μPC1032H
IC2 : AN6551
IC3,4 : NE646N
D1,2 : IN60
D3~7 : IS1555 or IS2076
EQ AMP
PRE AMP
BIAS TRAP
PLAYBACK LEVEL
RECORD LEVEL
REC AMP
ALC DETECT
UNRECORDED SECTION DETECTOR
GAIN CHANGE
INVERTER
DOLBY LEVEL TP (L ch)
DOLBY LEVEL TP (R ch)
TP GND
TRAP TP L ch
TRAP TP R ch
L ch R/P HEAD
R ch R/P HEAD
ERASE HEAD
BIAS OSC
BIAS CURRENT
BIAS OSC ON/OFF
H(UN-RECORDED SECTION) L(RE-CORDED SECTION)
DPSS
REC/PLAY SW
REC MUTE
PLAY/CUE REVIEW SELECTION
BIAS OSC
GND
DOLBY LED
(+9V: DOLBY ON)
PLAY OUT L ch
PLAY OUT GND
PLAY OUT R ch
GND
REC IN L ch
REC IN GND
REC IN R ch
+9V
+12V
GND
Q1~4,11,12,32 : 2SC1845(F,E)
Q5~10,13~21,23,24,27,29~31,33~36 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q22,26,28 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q25 : 2SA992(F,E)
Q37 : 2SD592NC(Q,R,S)
Q38,39 : 2SC1384(Q,R)
BEAT CANCEL (X28-1410-10) (C/4)
BEAT CANCEL
S1
POSI-TION | BIAS OSC | CLOCK
A | 85KHz | 415KHz
B | 87KHz | 415KHz
C | 83KHz | 403KHz
TAPE SELECTOR (X28-1410-10)(B/4)
NORMAL
CrO2
METAL
DOLBY
S2-a S2-b S2-c S2-d
ON OFF
TAPE END DETECT (X05-2060-10)(F/7)
IC10
HALL IC
IC10 : DN6838
CONTROL SW (X13-3280-10)(1/2)
S6 S5 S2 S4 S1 S3
S1 : PLAY
S2 : REW
S3 : STOP
S4 : FF
S5 : REC／PAUSE
S6 : AUTO REC MUTE
LOGIC (X05-2060-10)(D/7)
IC9
IC8
CLOCK FREQUENCE CHANGE
PLAY SOURCE (H) PLAY
PLAY, CUE, REVIEW — MUTE
POWER OFF MUTE
BEAT CANCEL
TIMER PLAY/REC (X05-2060-10)(E/7)
PLAY S2 REC
CASSETTE MECHANISM ASS'Y
REW
REC SW
FF
MOTOR
REW SOL
FF SOL
LEAF SW
MECHA-NISM RESET
ON (REW SOLENOID:ON)
ON (FF SOLENOID:ON)
OFF (EJECT)
Q57~62,65~67 : 2SC94 2SC16
Q63,64,68 : 2SD3 2SD5
IC8 : 78LO
IC9 : μPD6
D71~81,83,89,91 : IS207 IS155
D88,94 : XZ-O
D90 : VO3C
D92,93,101 : WO6E
D97,98 : IN60
D99,100 : VO6E

When measuring the signal level of the recording circuit, shortcircuit the base of Q36 and GND

Position	Bias current	Erace current	Test tape
Normal	360μA	60mA	AC-223
CrO2	500μA	80mA	AC-512
Metal	800μA	140mA	AC-711

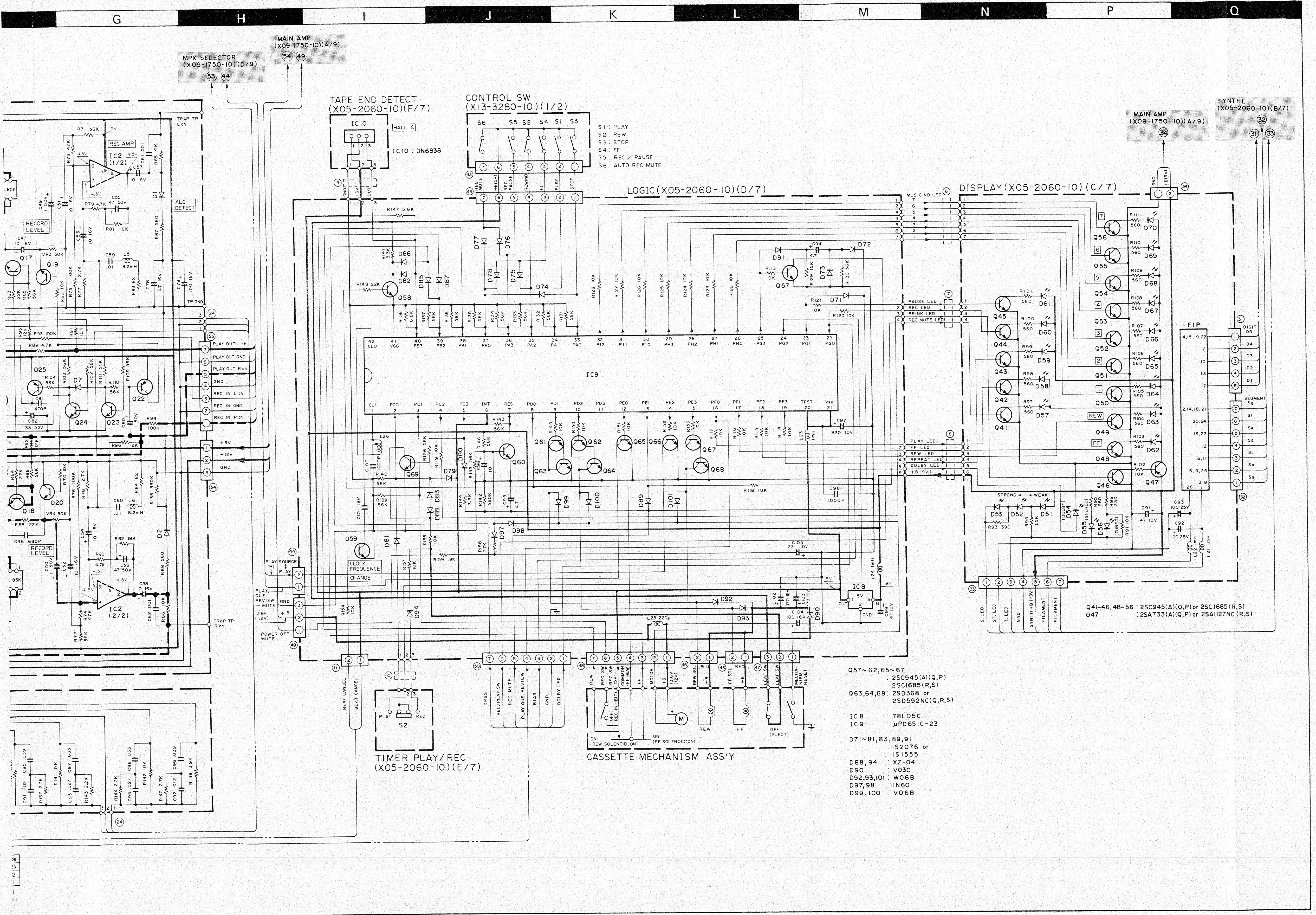
Measure the DC voltage across R135. (Erace current)

Measure the DC voltage across R1 or R2 (Bias current)


2SC2668
B C E
2SD313T-AL (E)
2SD330 (E,F)
B C E
2SK105 (H.J)
D G S
KB4424A
9 16 8 1
μPD4035
9 16 8 1
NE646N
HA1137W
9 16 8 1
μPD1703C-016
15 28 14 1
MB74LS42M
9 16 8 1
μPD651C-23
1 21 42 22
2SA1127NC PR.S)
2SA733 (A) (Q.P)
2SA992 (F.E)
2SC2378 (Q.P.K)
2SC945 (A)
2SC1685 (R.S)
2SC1384 (Q.R)
2SC1845 (F.E)
2SD592NC (Q.R.S)
E C B
2SK55 (E)
D S G
2SK61 (Y)
D S G
3SK85
G2 D G1 S
μPB553AC
8 5 1

STEREO DECK AMPLI-TUNER

DC-20X


G
H
I
J
K
L
M
N
P
Q
MPX SELECTOR (X09-1750-10)(D/9)
MAIN AMP (X09-1750-10)(A/9)
TAPE END DETECT (X05-2060-10)(F/7)
IC10
HALL IC
IC10 : DN6838
CONTROL SW (X13-3280-10)(1/2)
S1 : PLAY
S2 : REW
S3 : STOP
S4 : FF
S5 : REC／PAUSE
S6 : AUTO REC MUTE
MAIN AMP (X09-1750-10)(A/9)
SYNTHE (X05-2060-10)(B/7)
LOGIC (X05-2060-10)(D/7)
DISPLAY (X05-2060-10)(C/7)
REC AMP
IC2 (1/2)
IC2 (2/2)
ALC DETECT
RECORD LEVEL
TRAP TP L ch
TRAP TP R ch
TP GND
PLAY OUT L ch
PLAY OUT GND
PLAY OUT R ch
GND
REC IN L ch
REC IN GND
REC IN R ch
+9V
+12V
GND
IC9
IC8
FIP
DIGIT
SEGMENT
MUSIC NO. LED
PAUSE LED
REC LED
BRINK LED
REC MUTE LED
PLAY LED
FF LED
REW LED
REPEAT LED
DOLBY LED
+B(19V)
STRONG
WEAK
CLOCK FREQUENCY
CHANGE
PLAY SOURCE
PLAY, CUE, REVIEW MUTE
POWER OFF MUTE
BEAT CANCEL
TIMER PLAY/REC (X05-2060-10)(E/7)
PLAY
REC
S2
CASSETTE MECHANISM ASS'Y
REW SOLENOID : ON
FF SOLENOID : ON
LEAF SW
MECHANISM RESET
MOTOR
S.LED
ST.LED
T.LED
GND
SYNTH +B(19V)
FILAMENT
FILAMENT
Q41~46, 48~56 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q47 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q57~62, 65~67 : 2SC945(A)(Q,P)
2SC1685(R,S)
Q63,64,68 : 2SD368 or
2SD592NC(Q,R,S)
IC8 : 78L05C
IC9 : μPD651C-23
D71~81,83,89,91 : IS2076 or
IS1555
D88,94 : XZ-041
D90 : V03C
D92,93,101 : W06B
D97,98 : IN60
D99,100 : V06B

C-60
KENWOOD

SPECIFICATIONS

TAPE DECK SECTION

Type	Front Loading Stereo Cassette Deck with Dolby* NR System
Track System	4-Track, 2-Channel Stereo/Mono, Recording/Playback
Recording System	AC Bias System (Bias Frequency: 85 kHz)
Erasing System	AC System
Tape Speed	4.76 cm/sec (1-7/8 ips)
Heads	Record and Playback Head × 1 (Permlic Hi-B Ferrite) Erase Head × 1 (Sendust Alloy Ferrite)
Motor	Electronically Controlled DC Motor
Fast Winding Time	Approx. 105 seconds with C-60 tape
Frequency Response	
Normal Tape	25 Hz to 15000 Hz (30 Hz to 14000 Hz, ±3 dB)
Chrome Tape	25 Hz to 15000 Hz (30 Hz to 14000 Hz, ±3 dB)
Metal Tape	25 Hz to 16000 Hz (30 Hz to 15000 Hz, ±3 dB)
Signal to Noise Ratio	
Dolby NR ON (Over 5 kHz)	60 dB (Normal Tape), 61 dB (Chrome Tape), 61 dB (Metal Tape)
Dolby NR OFF	51 dB (Normal Tape), 52 dB (Chrome Tape), 52 dB (Metal Tape)
Harmonic Distortion	Less than 1% (at 1 kHz, 0 VU with Metal Tape)
Wow and Flutter	0.05% (W.R.M.S.)
Built-in Features	Dolby Noise Reduction System Direct Program Search System by Micro-Computer Full Auto Shut Off Mechanism in all Modes Timer Standby Mechanism Automatic Level Control

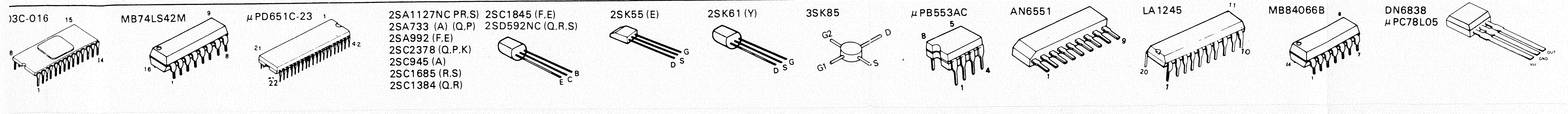
* DOLBY and the double-D symbol are trade marks of Dolby Laboratories Licensing Corporation.
Noise reduction circuit made under license from Dolby Laboratories Licensing Corporation.

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

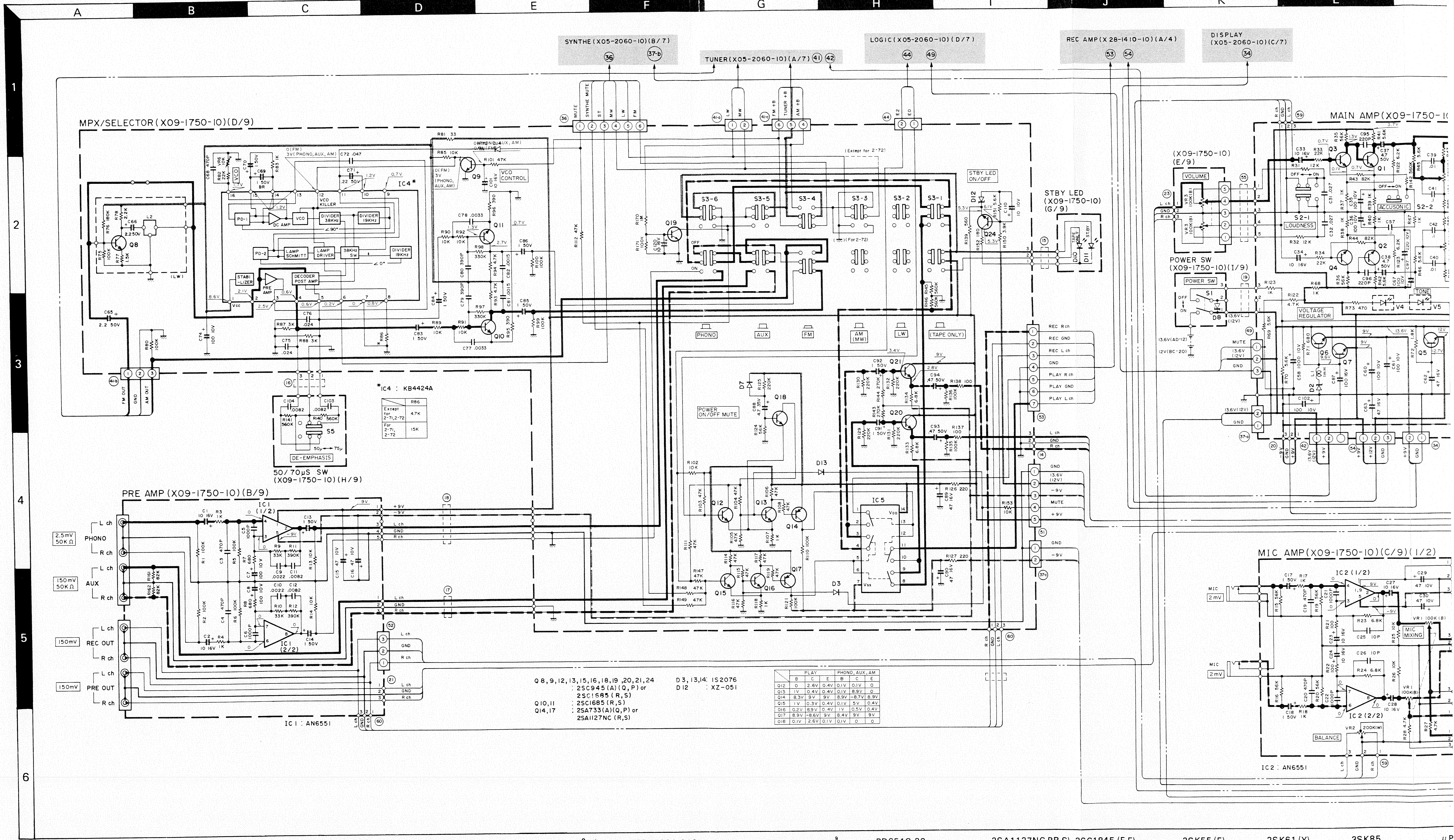
Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

- DC voltages are measured by a VOM of 20 kΩ/V input impedance.
- Les tensions de courant continu sont measurées par un multimétre d'une impédance d'entrée de 20 kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20kΩ/V Eingangs-Impedanz gemessen.


)3C-016
MB74LS42M
μPD651C-23
2SA1127NC PR.S)
2SA733 (A) (Q.P)
2SA992 (F.E)
2SC2378 (Q.P.K)
2SC945 (A)
2SC1685 (R.S)
2SC1384 (Q.R)
2SC1845 (F.E)
2SD592NC (Q.R.S)
E
C
B
2SK55 (E)
G
D
S
2SK61 (Y)
D
S
G
3SK85
G2
D
G1
S
μPB553AC
AN6551
LA1245
MB84066B
DN6838
μPC78L05
OUT
GND
Vcc

KENWOOD

STEREO DECK AMPLI-TUNER


A
B
C
D
E
F
G
H
I
J
K
L
1
2
3
4
5
6
SYNTHE (X05-2060-10) (B/7)
TUNER (X05-2060-10) (A/7)
LOGIC (X05-2060-10) (D/7)
REC AMP (X28-1410-10) (A/4)
DISPLAY (X05-2060-10) (C/7)
MPX/SELECTOR (X09-1750-10) (D/9)
MAIN AMP (X09-1750-10)
(X09-1750-10) (E/9)
VOLUME
LOUDNESS
ACCUSONIC
STBY LED ON/OFF
STBY LED (X09-1750-10) (G/9)
POWER SW (X09-1750-10) (I/9)
VOLTAGE REGULATOR
VCO CONTROL
IC4*
VCO KILLER
DC AMP
VCO
DIVIDER 38KHz
DIVIDER 19KHz
LAMP SCHMITT
LAMP DRIVER
38KHz SW
DIVIDER 19KHz
STABI-LIZER
PRE AMP
DECODER POST AMP
PD-1
PD-2
(LW)
S3-6
S3-5
S3-4
S3-3
S3-2
S3-1
PHONO
AUX
FM
AM (MW)
LW
(TAPE ONLY)
(Except for 2-72)
(For 2-72)
POWER ON/OFF MUTE
IC5
DE-EMPHASIS
50/70μS SW (X09-1750-10) (H/9)
PRE AMP (X09-1750-10) (B/9)
IC1 (1/2)
IC1 (2/2)
2.5mV 50KΩ
PHONO
150mV 50KΩ
AUX
150mV
REC OUT
150mV
PRE OUT
L ch
R ch
REC R ch
REC GND
REC L ch
PLAY R ch
PLAY GND
PLAY L ch
MUTE
+9V
-9V
IC1 : AN6551
MIC AMP (X09-1750-10) (C/9) (1/2)
IC2 (1/2)
IC2 (2/2)
MIC 2mV
MIC MIXING
BALANCE
IC2 : AN6551

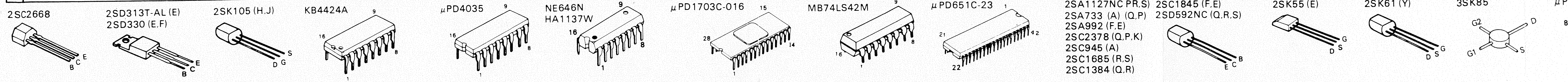
*IC4 : KB4424A

	R86
Except for 2-71, 2-72	4.7K
For 2-71, 2-72	15K

	PLAY			PHONO, AUX, AM		
	B	C	E	B	C	E
Q12	0	2.6V	0.4V	0.1V	0.1V	0
Q13	1V	0.4V	0.4V	0.1V	8.9V	0
Q14	8.3V	9V	9V	8.9V	-8.7V	8.9V
Q15	1V	0.3V	0.4V	0.1V	5V	0.4V
Q16	0.2V	8.9V	0.4V	1V	0.5V	0.4V
Q17	8.9V	-8.6V	9V	8.4V	9V	9V
Q18	0.1V	2.6V	0.1V	0.1V	0	0

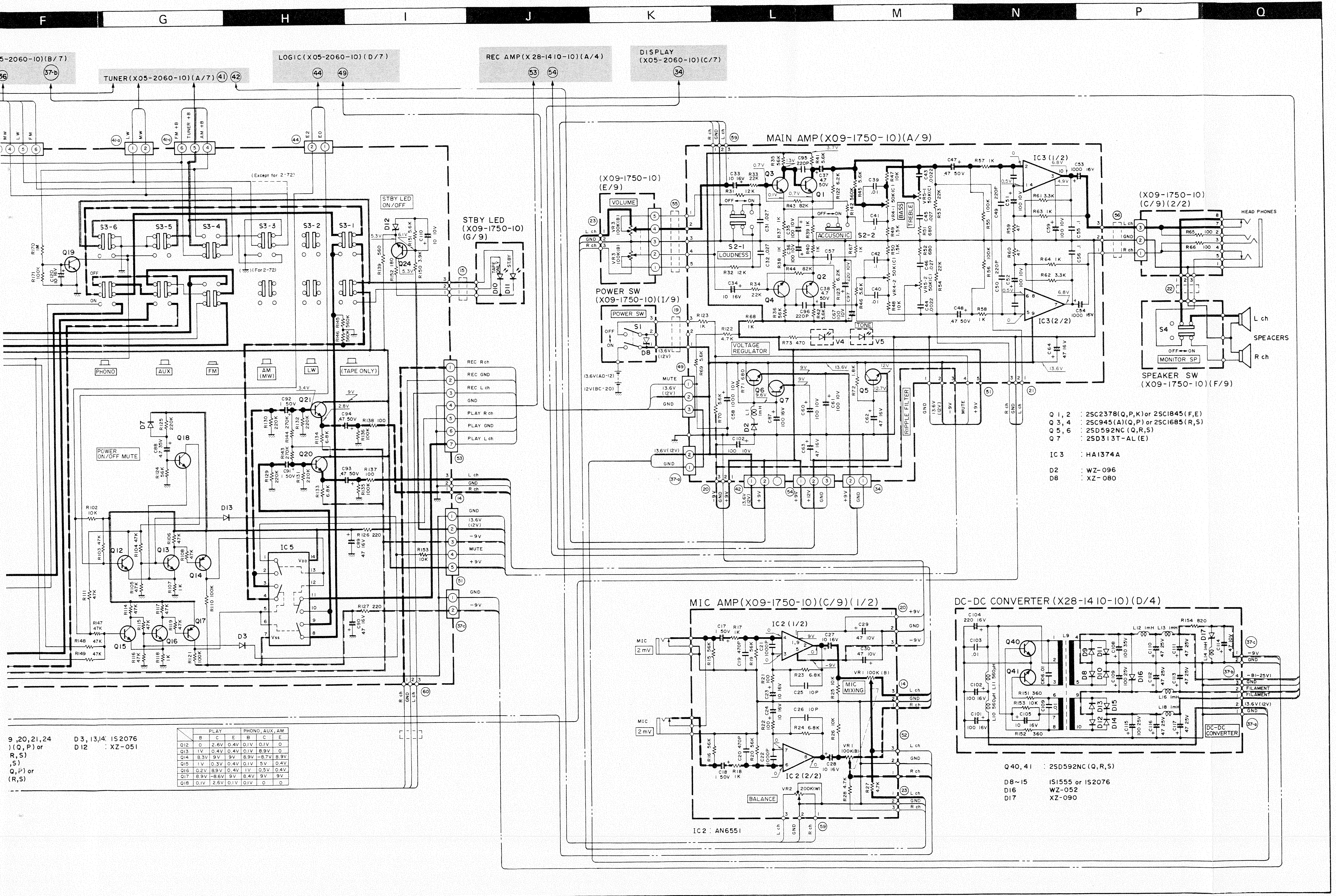
Q8, 9, 12, 13, 15, 16, 18, 19, 20, 21, 24
: 2SC945(A)(Q, P) or
2SC1685 (R, S)
Q10, 11 : 2SC1685 (R, S)
Q14, 17 : 2SA733(A)(Q, P) or
2SA1127NC (R, S)

D3, 13, 14: 1S2076
D12 : XZ-051


2SC2668
2SD313T-AL (E)
2SD330 (E.F)
2SK105 (H.J)
KB4424A
μPD4035
NE646N
HA1137W
μPD1703C-016
MB74LS42M
μPD651C-23
2SA1127NC PR.S)
2SA733 (A) (Q.P)
2SA992 (F.E)
2SC2378 (Q.P.K)
2SC945 (A)
2SC1685 (R.S)
2SC1384 (Q.R)
2SC1845 (F.E)
2SD592NC (Q.R.S)
2SK55 (E)
2SK61 (Y)
3SK85
B
C
E
D
G
S
G1
G2
1
8
9
14
15
16
21
22
28
42

STEREO DECK AMPLI-TUNER

DC-20X


F
G
H
I
J
K
L
M
N
P
Q
-2060-10)(B/7)
TUNER(X05-2060-10)(A/7) (41) (42)
LOGIC(X05-2060-10)(D/7) (44) (49)
REC AMP(X28-1410-10)(A/4) (53) (54)
DISPLAY (X05-2060-10)(C/7) (34)
MAIN AMP(X09-1750-10)(A/9)
(X09-1750-10) (E/9)
VOLUME
LOUDNESS
ACCUSONIC
BASS
TREBLE
TONE
VOLTAGE REGULATOR
RIPPLE FILTER
IC3 (1/2)
IC3 (2/2)
(X09-1750-10) (C/9)(2/2)
HEAD PHONES
SPEAKER SW (X09-1750-10)(F/9)
MONITOR SP
SPEACERS
L ch
R ch
STBY LED (X09-1750-10) (G/9)
STBY LED ON/OFF
POWER SW (X09-1750-10)(I/9)
POWER ON/OFF MUTE
PHONO
AUX
FM
AM (MW)
LW
(TAPE ONLY)
IC5
MIC AMP(X09-1750-10)(C/9)(1/2)
IC2 (1/2)
IC2 (2/2)
MIC MIXING
BALANCE
DC-DC CONVERTER(X28-1410-10)(D/4)
DC-DC CONVERTER
IC2 : AN6551

Q 1, 2 : 2SC2378(Q,P,K) or 2SC1845(F,E)
Q 3, 4 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q 5, 6 : 2SD592NC(Q,R,S)
Q 7 : 2SD313T-AL(E)

IC3 : HA1374A

D2 : WZ-096
D8 : XZ-080

Q40, 41 : 2SD592NC(Q,R,S)

D8~15 IS1555 or IS2076
D16 WZ-052
D17 XZ-090

9 ,20, 21, 24
)(Q, P) or
R, S)
,S)
Q, P) or
(R,S)

D 3, 13, 14: IS2076
D 12 : XZ-051

	PLAY			PHONO, AUX, AM		
	B	C	E	B	C	E
Q12	0	2.6V	0.4V	0.1V	0.1V	0
Q13	1V	0.4V	0.4V	0.1V	8.9V	0
Q14	8.3V	9V	9V	8.9V	−8.7V	8.9V
Q15	1V	0.3V	0.4V	0.1V	5V	0.4V
Q16	0.2V	8.9V	0.4V	1V	0.5V	0.4V
Q17	8.9V	−8.6V	9V	8.4V	9V	9V
Q18	0.1V	2.6V	0.1V	0.1V	0	0

SPECIFICATIONS

AUDIO SECTION	
Monitor Power Output	
into 8 ohms at 1,000 Hz, 1% THD	1.7W + 1.7W
Input Sensitivity/Impedance	
PHONO (MM)	2.5 mV/50 kohms
AUX	150 mV/30 kohms
MIC	2 mV/5 kohms
Signal-to-Noise Ratio (A weighted)	
PHONO (MM)	70 dB for 2.5 mV input
AUX	88 dB
MIC	65 dB
Maximum PHONO Input Level	
at 1,000 Hz	55 mV (RMS), THD 0.3%
Frequency Response	
PHONO RIAA Standard Curve	30 Hz to 15 kHz ±0.2 dB
AUX	20 Hz to 60 kHz +0 dB, −3 dB
Tone Control	
BASS	±10 dB at 100 Hz
TREBLE	±10 dB at 10 kHz
Loudness Control (VOL. −30 dB)	+8 dB at 100 Hz
Output Level/Impedance	
REC OUT	150 mV/10 kohms
PRE OUT	150 mV/10 kohms

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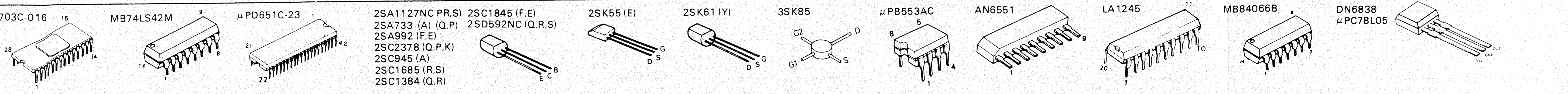
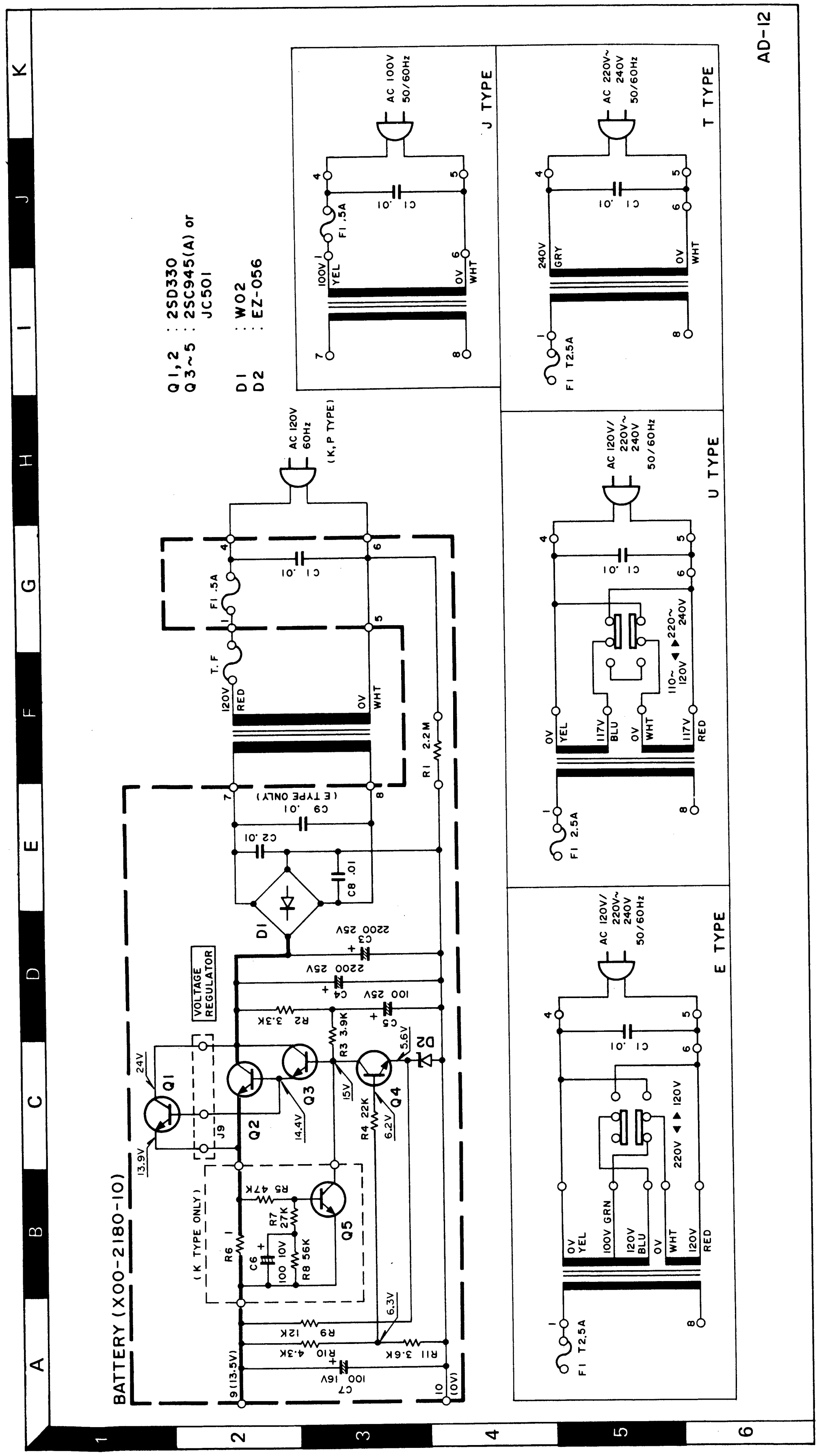
Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

- DC voltages are measured by a VOM of 20 kΩ/V input impedance.
- Les tensions de courant continu sont measurées par un multimétre d'une impédance d'entrée de 20 kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20 kΩ/V Eingangs-Impedanz gemessen.


μPD1703C-016
15
28
14
1
MB74LS42M
9
16
8
1
μPD651C-23
1
21
42
22
2SA1127NC PR,S)
2SA733 (A) (Q,P)
2SA992 (F,E)
2SC2378 (Q,P,K)
2SC945 (A)
2SC1685 (R,S)
2SC1384 (Q,R)
2SC1845 (F,E)
2SD592NC (Q,R,S)
E
C
B
2SK55 (E)
D
S
G
2SK61 (Y)
D
S
G
3SK85
G2
D
G1
S
μPB553AC
5
8
4
1
AN6551
9
1
LA1245
11
20
10
1
MB84066B
8
14
7
1
DN6838
μPC78L05
OUT
GND
Vcc

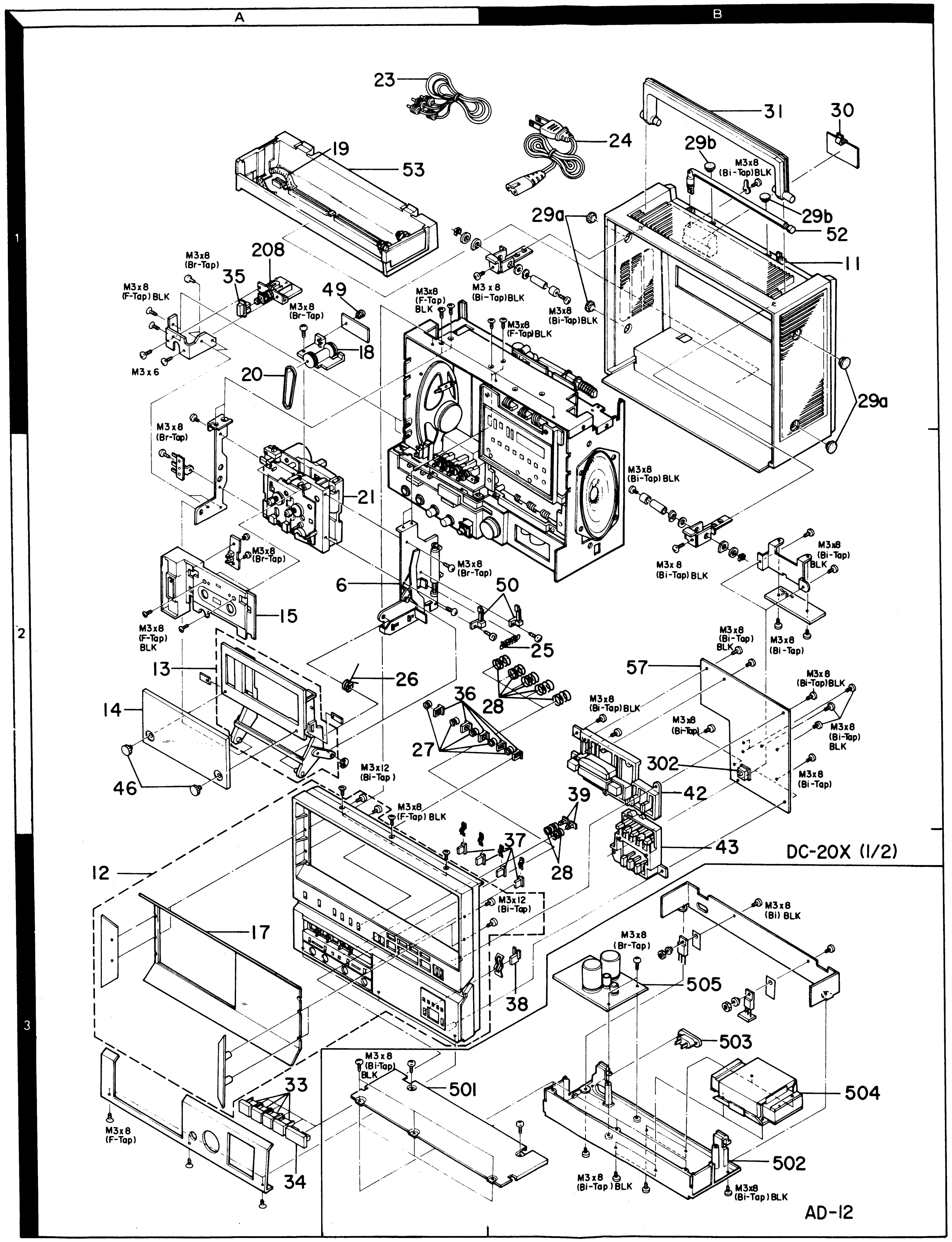

AD-12
Q1,2 : 2SD330
Q3~5 : 2SC945(A) or JC501
D1 : W02
D2 : EZ-056
J TYPE
AC 100V 50/60Hz
T TYPE
AC 220V~ 240V 50/60Hz
U TYPE
AC 120V/ 220V~ 240V 50/60Hz
E TYPE
AC 120V/ 220V~ 240V 50/60Hz
AC 120V 60Hz (K,P TYPE)
(E TYPE ONLY)
(K TYPE ONLY)
VOLTAGE REGULATOR
BATTERY (X00-2180-10)
F1 .5A
F1 T2.5A
T.F
C1 .01
C2 .01
C8 .01
C9 .01
C3 2200 25V
C4 100 25V
C5 2200 25V
C6 100 10V
C7 100 16V
R1 2.2M
R2 3.3K
R3 3.9K
R4 22K
R5 47K
R6
R7 27K
R8 56K
R9 12K
R10 4.3K
R11 3.6K
Q1
Q2
Q3
Q4
Q5
D1
D2
J9
24V
13.9V
14.4V
15V
6.2V
5.6V
6.3V
9(13.5V)
10 (0V)
100V YEL
0V WHT
240V GRY
120V RED
0V YEL
117V BLU
117V RED
100V GRN
120V BLU
120V RED
220V
110~120V ◀ ▶ 220~240V
220V ◀ ▶ 120V
A B C D E F G H I J K
1 2 3 4 5 6

SPECIFICATIONS

GENERAL	
Power Consumption	0 3A (UL and CSA) 40W (IEC) 40W (8 ohms at rated power)
Dimensions (DC-20P + DC-20X)	W 290 mm (11-13/32") H 309 mm (12-5/32") D 150 mm (5-29/32")
Weight (Net)	6 2 kg (13 7 lb)

EXPLODED VIEW (1)

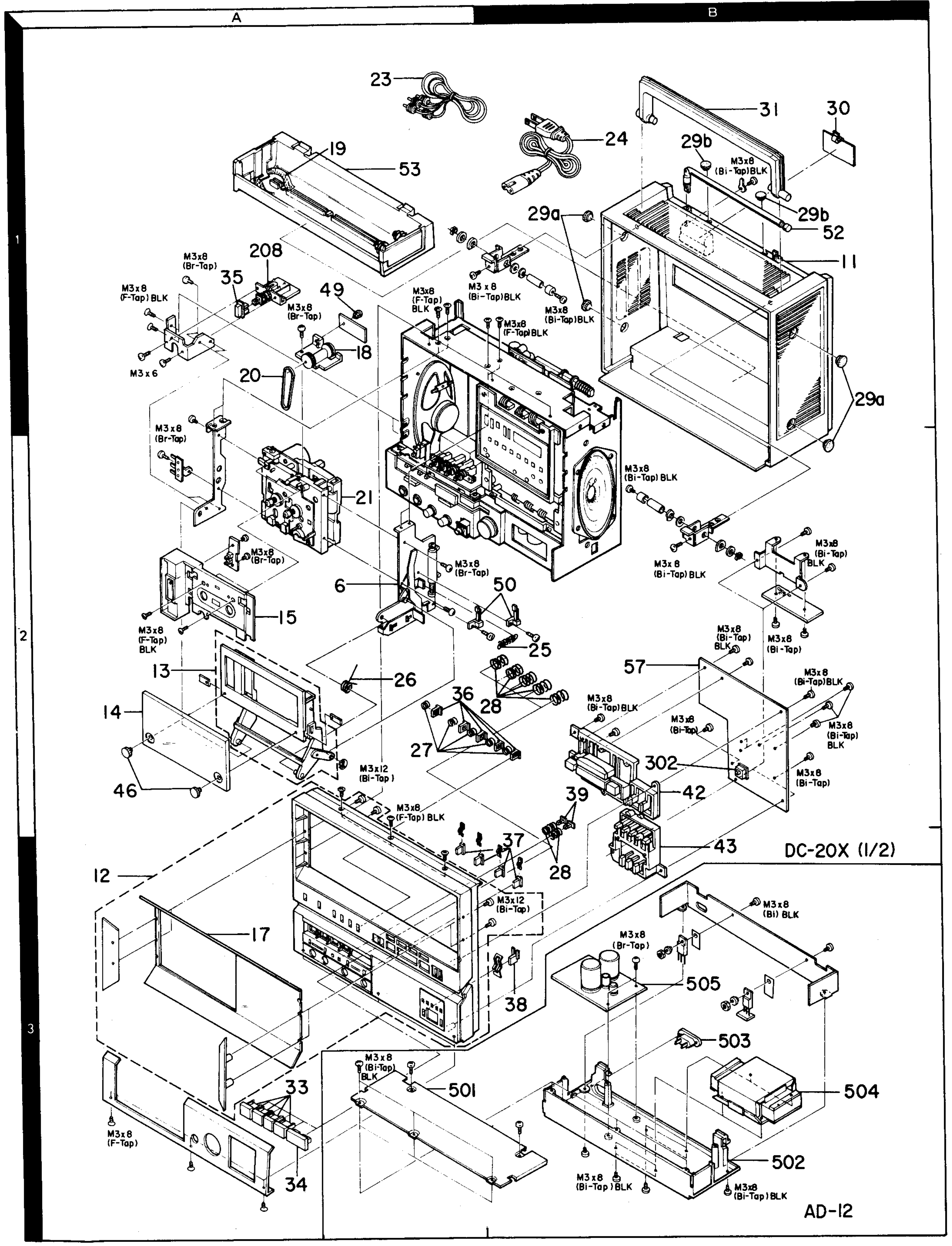
Refer to Parts List on page 58.


A
B
1
2
3
23
24
31
30
29b
29a
52
11
19
53
208
35
49
18
20
21
6
15
50
25
13
14
46
26
36
28
27
57
302
42
39
43
37
28
12
17
38
505
503
33
34
501
504
502
M3x8 (Br-Tap)
M3x8 (F-Tap) BLK
M3x6
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap)
M3x8 (F-Tap)
M3x12 (Bi-Tap)
M3x8 (Bi) BLK
DC-20X (1/2)
AD-12

Refer t

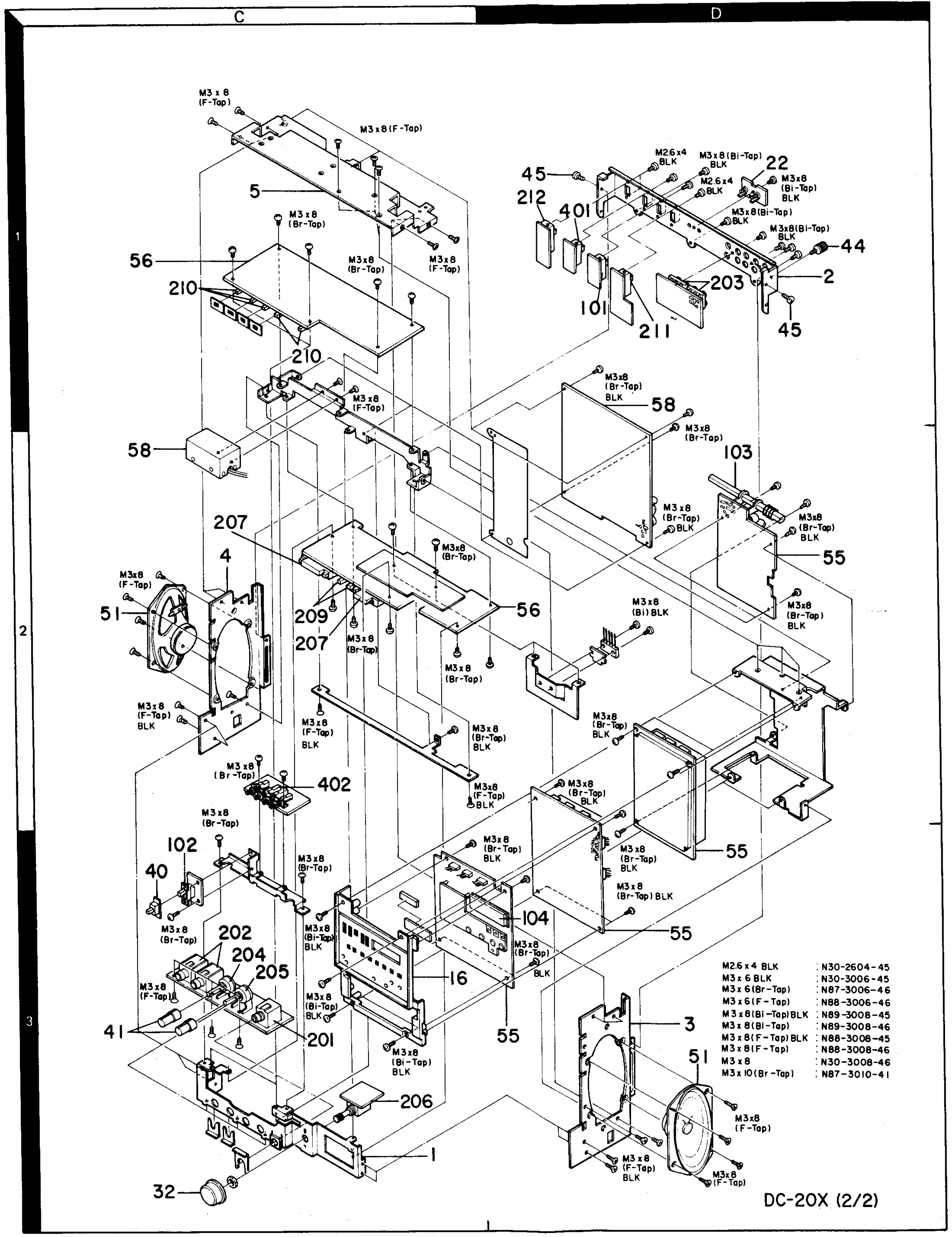
EXPLODED VIEW (1)

Refer to Parts List on page 58.


A
B
1
2
3
23
24
31
30
29b
M3x8 (Bi-Tap)BLK
19
53
29a
29b
52
11
M3x8 (Br-Tap)
208
35
49
M3x8 (F-Tap) BLK
M3x8 (Br-Tap)
18
M3x6
M3x8 (F-Tap) BLK
M3 x 8 (Bi-Tap)BLK
M3x8 (F-Tap)BLK
M3x8 (Bi-Tap)BLK
20
29a
M3x8 (Br-Tap)
21
M3x8 (Bi-Tap) BLK
M3x8 (Br-Tap)
6
M3x8 (Br-Tap)
50
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap) BLK
15
M3x8 (F-Tap) BLK
25
13
26
57
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap)
M3x8 (Bi-Tap)BLK
14
36
28
27
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap)
M3x8 (Bi-Tap) BLK
302
M3x8 (Bi-Tap)
46
M3x12 (Bi-Tap)
39
42
M3x8 (F-Tap) BLK
37
28
43
DC-20X (1/2)
12
M3x12 (Bi-Tap)
M3x8 (Bi) BLK
17
M3x8 (Br-Tap)
505
38
503
33
M3x8 (Bi-Tap) BLK
501
504
M3x8 (F-Tap)
34
502
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap) BLK
AD-12

EXPLODED VIEW (2)

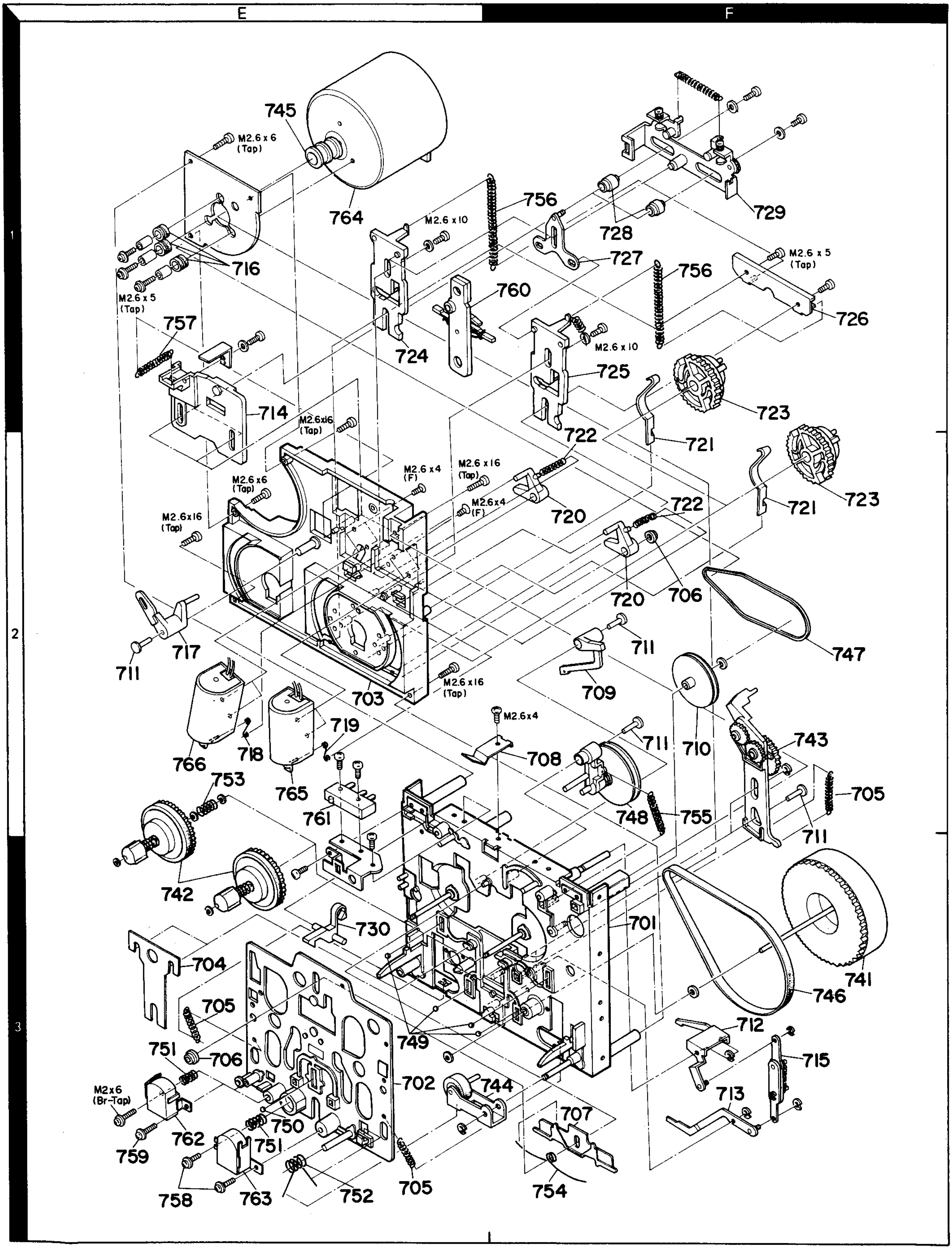
Refer to Parts List on page 58.


C
D
1
2
3
M3 x 8 (F-Tap)
M3 x 8 (F-Tap)
5
M3x8 (Br-Tap)
M3x8 (Br-Tap)
M3x8 (F-Tap)
56
210
210
M2.6 x 4 BLK
M3 x 8 (Bi-Tap) BLK
22
45
212
401
M2.6 x 4 BLK
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap) BLK
M3x8 (Bi-Tap) BLK
44
101
211
203
2
45
M3x8 (Br-Tap) BLK
58
M3x8 (F-Tap)
58
M3x8 (Br-Tap)
103
207
M3x8 (Br-Tap)
M3x8 (Br-Tap) BLK
M3x8 (Br-Tap) BLK
55
M3x8 (F-Tap)
4
51
209
207
56
M3x8 (Bi) BLK
M3x8 (Br-Tap) BLK
M3x8 (Br-Tap)
M3x8 (F-Tap) BLK
M3x8 (F-Tap) BLK
M3x8 (Br-Tap) BLK
M3x8 (Br-Tap) BLK
M3x8 (Br-Tap)
402
M3x8 (F-Tap) BLK
M3x8 (Br-Tap) BLK
M3x8 (Br-Tap)
102
M3x8 (Br-Tap)
40
M3x8 (Br-Tap) BLK
55
M3x8 (Br-Tap) BLK
M3x8 (Bi-Tap) BLK
104
55
M3x8 (Br-Tap)
202
204
205
M3x8 (Br-Tap) BLK
16
M3x8 (F-Tap)
M3x8 (Bi-Tap) BLK
41
201
M3x8 (Bi-Tap) BLK
55
3
51
206
M3x8 (F-Tap)
M3x8 (F-Tap) BLK
M3x8 (F-Tap)
32
1
DC-20X (2/2)

M2.6 x 4 BLK	: N30-2604-45
M3 x 6 BLK	: N30-3006-45
M3 x 6 (Br-Tap)	: N87-3006-46
M3 x 6 (F-Tap)	: N88-3006-46
M3 x 8 (Bi-Tap) BLK	: N89-3008-45
M3 x 8 (Bi-Tap)	: N89-3008-46
M3 x 8 (F-Tap) BLK	: N88-3008-45
M3 x 8 (F-Tap)	: N88-3008-46
M3 x 8	: N30-3008-46
M3 x 10 (Br-Tap)	: N87-3010-41

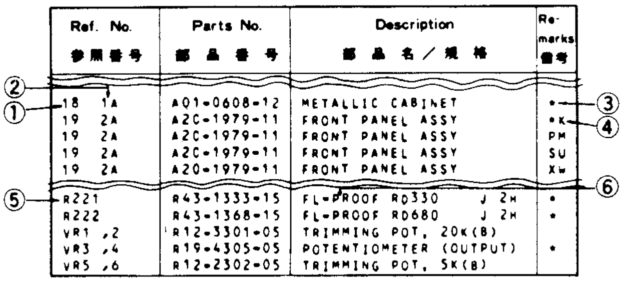
EXPLODED VIEW (MECHANISM)

Refer to Parts List on page 63.


E
F
1
2
3
745
M2.6 x 6 (Tap)
764
716
M2.6 x 5 (Tap)
757
714
M2.6x16 (Tap)
M2.6 x6 (Tap)
M2.6x16 (Tap)
717
711
756
M2.6 x 10
724
760
727
728
729
M2.6 x 5 (Tap)
726
756
M2.6 x 10
725
723
721
722
M2.6 x4 (F)
M2.6 x 16 (Tap)
M2.6x4 (F)
720
722
721
723
720
706
747
711
709
703
M2.6 x16 (Tap)
766
718
719
765
M2.6x4
708
711
710
743
705
711
753
761
748
755
742
730
701
704
705
706
751
M2x6 (Br-Tap)
762
759
750
751
758
763
752
702
744
749
705
707
754
712
746
741
713
715

PARTS LIST

INSTRUCTION FOR PARTS LIST



Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
18 1A	A01-0608-12	METALLIC CABINET	*
19 2A	A2C-1979-11	FRONT PANEL ASSY	*K
19 2A	A2C-1979-11	FRONT PANEL ASSY	PM
19 2A	A2C-1979-11	FRONT PANEL ASSY	SU
19 2A	A20-1979-11	FRONT PANEL ASSY	XW
R221	R43-1333-15	FL-PROOF RD330 J 2H	*
R222	R43-1368-15	FL-PROOF RD680 J 2H	*
VR1 ,2	R12-3301-05	TRIMMING POT, 20K(B)	
VR3 ,4	R19-4305-05	POTENTIOMETER (OUTPUT)	*
VR5 ,6	R12-2302-05	TRIMMING POT, 5K(B)	

① Exploded view drawing No.
② Position in exploded view.
③ Symbol of new parts.
④ Area to which parts are shipped. Example: A20-1390-13 is the part No. of FRONT PANEL ASS'Y for the "K" type products (for U.S.A.). When this column is blank, it means that the same type of parts (same parts No.) are used for the products shipped to all areas.
⑤ Reference No. in schematic diagram.
⑥ Abbreviation of "ceramic capacitor".
All capacitors and resistors are listed using abbreviations. Abbreviations.

* Abbreviations of capacitors (Parts No. with initial letter "C").

ELECTRO	Electrolytic capacitor
LL-ELEC	Low leak electrolytic capacitor
NP-ELEC	Non-pole electrolytic capacitor
MICA	Mica capacitor
POLYSTY	Polystyrene capacitor
MYLAR	Mylar capacitor
CERAMIC	Ceramic capacitor
TANTAL	Tantalum capacitor
MF	Metallized film capacitor
MP	Metallized paper capacitor
OIL	Oil capacitor

The unit "UF" is used in lieu of "μF".

* Abbreviations of resistors (Parts No. with initial letters "R").

RC	Carbon composition resistor	
RD	Carbon film resistor	
FL-PROOF RD	Flame-proof carbon film resistor	
RW	Wire wound power resistor	
FL-PROOF RS	Flame-proof metal oxide film resistor	
RN	Metal film resistor	
FUSE-RESIST	Resistor with fuse function	
2B	Rated wattage	1/8W
2E	Rated wattage	1/4W
2H	Rated wattage	1/2W
3A	Rated wattage	1W
3D	Rated wattage	2W
3F	Rated wattage	3W
3G	Rated wattage	4W
3H	Rated wattage	5W

All resistor values are indicated with the unit (Ω) omitted.

* Abbreviations common to capacitors and resistors.

C	±0.25pF (Used for capacitors only)
D	±0.5pF (Used for capacitors only)
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
Z	+80%, −20%(Used for capacitors only)
P	+100%, −0%(Used for capacitors only)

Resistors RD (carbon composition resistors) are not listed in the parts list. For values, refer to the schematic diagram.

Ref. No. 参照番号		Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
UNIT DC-20X		K:USA X:AUSTRARIA P:CANADA T :ENGLAND [UE] :AAFES H :AUDIO CLUB	U:PX E:SCANDINAVIA & EUROPE DC20XL [E] :SCANDINAVIA & EUROPE [T] :ENGLAND	
1	3C	NO STOCK	SUB PANEL	
2	1D	NO STOCK	REAR PANEL	
3	3D	NO STOCK	SIDE PLATE (R)	
4	2C	NO STOCK	SIDE PLATE (L)	
5	1C	NO STOCK	TOP PLATE	
6	2A	NO STOCK	MECHANISM ASSY(EJECT)	
11	1B	A02-0078-01	PLASTIC CABINET	*
12	3A	A20-1873-02	FRONT PANEL *KPUMHX	[UE]
12	3A	A20-1874-02	FRONT PANEL	*T
12	3A	A20-1875-02	FRONT PANEL	*[T]
12	3A	A20-1876-02	FRONT PANEL	*E
12	3A	A20-1877-02	FRONT PANEL	*[E]
13	2A	A53-0035-02	CASSETTE HOUSING	*
14	2A	A53-0036-04	CASSETTE LID	*
-		B46-0055-30	WARRANTY CARD(TK-CANADA	P
-		B46-0060-00	WARRANTY CARD	T[T]
-		B46-0061-30	WARRANTY CARD	K
-		B46-0062-30	WARRANTY CARD UH	[UE]
-		B46-0063-13	WARRANTY CARD UH	[UE]
-		B46-0064-20	WARRANTY CARD	X
-		B46-0078-03	WARRANTY CARD	E[E]
-		B50-3404-00	INSTRUCT MANUAL(E) *KUH	[UE]
-		B50-3405-00	INSTRUCT MANUAL(E,F) *P	MX
-		B50-3406-00	INSTRUCT MANUAL(E)	*T
-		B50-3407-00	INSTRUCT MANUAL(E)	*[T]
-		B50-3408-00	INSTRUCT MANUAL(4-LANG)	*E
-		B50-3409-00	INSTRUCT MANUAL(E,F)	*[E]
-		B50-3411-00	INSTRUCT MANUAL(SP)	*M
-		B59-0018-00	SERVICE STATIONS LIST	[UE]
15	2A	B03-0156-02	DRESSING PLATE	*
16	3C	B08-0015-02	DISPLAY PANEL	*
17	3A	B10-0306-03	FRONT GLASS *KPUMHXE	[UE]
17	3A	B10-0307-03	FRONT GLASS	*T
17	3A	B10-0308-03	FRONT GLASS	*[T]
17	3A	B10-0309-03	FRONT GLASS	*[E]
18	1A	D15-0186-04	PULLEY ASSY	*
19	1A	D16-0067-04	BELT	*
20	1A	D16-0068-04	BELT	*
21	2A	D40-0236-05	MECHANISM ASSY(CASSETTE	*
-		E04-0004-05	COAXIAL CONNECTOR T[T]	E[E]
-		E23-0015-04	EARTH LUG	
22	1D	E20-0229-05	TERMINAL BOARD	*
23	1A	E30-0505-05	CORD WITH PLUG	
24	1B	E30-0687-05	POWER CORD	KP
24	1B	E30-0688-05	POWER CORD UMH	[UE]
24	1B	E30-0691-05	POWER CORD	E[E]
24	1B	E30-1328-05	POWER CORD	T[T]
24	1B	E30-1342-05	POWER CORD	X
25	2B	G01-0430-04	COIL SPRING(EJECT)	*
26	2A	G01-0431-04	COIL SPRING	
27	3B	G01-0433-04	COIL SPRING	*
28	3B	G01-0434-04	COIL SPRING	
29A	1B	G11-0172-04	CUSHION	*
29B	1B	G11-0173-04	CUSHION	*
-		H01-3331-04	CARTON BOX *KPUMHXE	[UE]
-		H01-3332-04	CARTON BOX	*T
-		H01-3333-04	CARTON BOX	*[T]
-		H01-3334-04	CARTON BOX	*[E]

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
-	H10-1590-03	POLYSTYRENE FIXTURE	*
-	H10-1591-03	POLYSTYRENE FIXTURE	*
-	H12-0088-04	PACKING FIXTURE *UH	🅄🄴
-	H12-0089-04	PACKING FIXTURE	*
-	H25-0078-04	BAG (235X315)	
-	H25-0179-04	BAG (530X450)	
-	H39-0018-05	HANDLE	
30 1B	J19-0597-04	COVER	*
31 1B	K01-0069-03	HANDLE ASSY	*
32 3C	K23-0355-04	KNOB(VOLUME)	*
33 3A	K27-0630-04	KNOB(SELECTOR)	*
34 3A	K27-0631-04	KNOB(SELECTOR)DC-20X	*
35 1A	K27-0632-04	KNOB(POWER)	*
36 3B	K27-0633-04	KNOB(TAPE,SEL,EJ)	*
37 3B	K27-0634-04	KNOB(TONE)	*
38 3B	K27-0635-04	KNOB(AUTO,MANU)	*
39 3B	K27-0636-04	KNOB(LOUD,ACCU)	*
40 3C	K27-0637-04	KNOB(TIMER)	*
41 3C	K29-0377-14	KNOB(MIC,BALANCE)	*
42 2B	K29-0424-02	KNOB ASSY(CASSETTE)	*
43 3B	K29-0425-02	KNOB ASSY(SYNTHE)	*
-	N29-0035-05	PUSH RIVET(3,5X5,5)DC-20XL	
44 1D	N08-0128-35	GND TERMINAL	
45 1D	N09-0309-05	SCREW BR-TAP 3X8	
46 2A	N09-0385-04	SCREW	
47 1B	N09-0393-05	SCREW(F-TAP,3X8)	*
49 1A	N29-0221-05	PUSH RIVET(3,5X7)	
50 2A	S46-1008-05	LEAF SWITCH	*
51 2C,3D	T07-0068-05	LOUDSPEAKER(FULL-RANGE)	*
52 1B	T90-0113-05	ROD ANTENNA	*
-	W01-0301-05	HEAD CLEANING BAR	
53 1A	W01-0104-03	BC-20	*
55 2D,3D	X05-2060-10	TUNER PCB ASSY *	KP
55 2D,3D	X05-2060-71	TUNER PCB ASSY	*X
55 2D,3D	X05-2060-81	TUNER PCB ASSY UMH	🅄🄴
55 2D,3D	X05-2062-71	TUNER PCB ASSY	TE
55 2D,3D	X05-2062-72	TUNER PCB ASSY	🅃🄴
56 1C,2C	X09-1750-10	AUDIO AMP PCB ASSY *	KP
56 1C,2C	X09-1750-71	AUDIO AMP PCB ASSY	*X
56 1C,2C	X09-1750-81	AUDIO AMP PCB ASSY *UMH	🅄🄴
56 1C,2C	X09-1752-71	AUDIO AMP PCB ASSY	TE
56 1C,2C	X09-1752-72	AUDIO AMP PCB ASSY	🅃🄴
57 2B	X13-3280-10	SWITCH PCB ASSY	*
58 2D	X28-1410-10	REC/PLAY PCB ASSY*KPUMH	UE
58 2D	X28-1412-71	REC/PLAY PCB ASSY TE	🅃🄴
TUNER	**K:X05-2060-10 U:X05-2060-81 🄴:X05-2062-72 X:X05-2060-71 E:X05-2062-71**		
D51 -53	B30-0231-05	LED	
D54 ,55	B30-0312-05	LED	*
D56	B30-0231-05	LED	
D57 -63	B30-0241-05	LED	
D64 -70	B30-0312-05	LED	*
C2 -4	C91-0085-05	CERAMIC 0.022UF N	
C5	C24-1710-59	ELECTRO 1UF 50WV	
C6	C52-1739-16	CERAMIC 390PF K	
C7	C24-1710-59	ELECTRO 1UF 50WV	
C8	C91-0085-05	CERAMIC 0.022UF N	
C9	C24-6547-57	ELECTRO 4.7UF 35WV	
C10	C91-0083-05	CERAMIC 0.01UF N	

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
C11	C24-1747-51	ELECTRO 4.7UF 50WV	
C12 ,13	C91-0083-05	CERAMIC 0.01UF N	
C14	C24-1710-59	ELECTRO 1UF 50WV	
C15	C91-0083-05	CERAMIC 0.01UF N	
C16	C24-1210-69	ELECTRO 10UF 16WV	
C17	C91-0085-05	CERAMIC 0.022UF N	
C18	C55-1747-38	CERAMIC 0.047UF Z	🄴
C19	C47-1751-15	POLYSTY 51PF J	
C20	C70-1715-05	CERAMIC 15PF J	
C21	C47-1718-15	POLYSTY 180PF J	🄴
C22	C70-1768-05	CERAMIC 68PF J	🄴
C23	C91-0085-05	CERAMIC 0.022UF N	🄴
C24	C24-1210-69	ELECTRO 10UF 16WV	
C25	C55-1747-38	CERAMIC 0.047UF Z	🄴
C26	C24-1210-69	ELECTRO 10UF 16WV	
C27	C55-1747-38	CERAMIC 0.047UF Z	🄴
C28	C55-1710-38	CERAMIC 0.01UF Z	
C29	C70-1739-05	CERAMIC 39PF J	🄴
C30	C55-1710-38	CERAMIC 0.01UF Z	
C31	C91-0085-05	CERAMIC 0.022UF N	🄴
C32	C91-0083-05	CERAMIC 0.01UF N	🄴
C33	C24-1210-69	ELECTRO 10UF 16WV	
•C34	C91-0085-05	CERAMIC 0.022UF N	
C35	C55-1747-38	CERAMIC 0.047UF Z	
C36	C24-6547-57	ELECTRO 4.7UF 35WV	
C37	C24-1733-59	ELECTRO 3.3UF 50WV	
C38	C55-1747-38	CERAMIC 0.047UF Z	
C39	C24-1733-59	ELECTRO 3.3UF 50WV	
C40	C91-0083-05	CERAMIC 0.01UF N	
C41	C24-1010-79	ELECTRO 100UF 10WV	
C42	C46-1733-36	MYLAR 0.033UF K	
C43	C46-1722-25	MYLAR 0.0022UF J	
C44	C91-0085-05	CERAMIC 0.022UF N	
C45	C53-1710-27	CERAMIC 0.001UF M	
C46	C91-0083-05	CERAMIC 0.01UF N	
C47	C53-1710-27	CERAMIC 0.001UF M	
C48	C91-0085-05	CERAMIC 0.022UF N	
C49	C91-0083-05	CERAMIC 0.01UF N	
C50	C55-1710-38	CERAMIC 0.01UF Z	
C51	C24-1210-69	ELECTRO 10UF 16WV	
C52	C91-0083-05	CERAMIC 0.01UF N	
C56	C24-1210-69	ELECTRO 10UF 16WV	
C57 ,58	C91-0083-05	CERAMIC 0.01UF N	
C59	C55-1710-38	CERAMIC 0.01UF Z	
C60	C24-1210-69	ELECTRO 10UF 16WV	
C61 ,62	C55-1710-38	CERAMIC 0.01UF Z	
C63	C24-0810-79	ELECTRO 100UF 6.3WV	
C64	C91-0083-05	CERAMIC 0.01UF N	
C65 ,66	C71-1733-06	CERAMIC 33PF K	
C67	C24-1210-69	ELECTRO 10UF 16WV	
C68	C24-1047-69	ELECTRO 47UF 10WV	
C69	C25-1710-47	LL-ELEC 0.1UF 50WV	
C70	C25-1722-57	LL-ELEC 2.2UF 50WV	
C71	C46-1710-35	MYLAR 0.01UF J	
C72	C25-1722-57	LL-ELEC 2.2UF 50WV	
C73	C46-1733-35	MYLAR 0.033UF J	
C74	C24-1210-69	ELECTRO 10UF 16WV	
C75	C91-0083-05	CERAMIC 0.01UF N	
C76	C24-1210-69	ELECTRO 10UF 16WV	
C77	C24-1047-69	ELECTRO 47UF 10WV	
C78	C24-1210-69	ELECTRO 10UF 16WV	
C79	C91-0083-05	CERAMIC 0.01UF N	

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
C80	C24-1210-69	ELECTRO 10UF 16WV	
C81	C55-1710-38	CERAMIC 0.01UF Z	
C91	C24-1047-69	ELECTRO 47UF 10WV	
C92 ,93	C24-1410-79	ELECTRO 100UF 25WV	
C94 ,95	C24-6547-57	ELECTRO 4.7UF 35WV	
C96	C24-1222-69	ELECTRO 22UF 16WV	
C97	C24-1047-71	ELECTRO 470UF 10WV	
C98	C52-1710-26	CERAMIC 0.001UF K	
C99	C24-1047-69	ELECTRO 47UF 10WV	
C100	C52-1710-26	CERAMIC 0.001UF K	
C101	C71-1722-05	CERAMIC 22PF J	
C102,103	C24-1247-77	ELECTRO 470UF 16WV	
C104	C24-1210-79	ELECTRO 100UF 16WV	
C105	C24-1033-69	LL-ELEC 0.1UF 50WV	
TC1	C05-0302-05	TRIMMER CAPACITOR	
TC2	C05-0303-05	TRIMMER CAPACITOR	E
-	E40-0273-05	PIN CONNECTOR(2P)	
-	E40-0373-05	PIN CONNECTOR(3P)	
-	E40-0473-05	PIN CONNECTOR(4P)	
-	E40-0573-05	PIN CONNECTOR(5P)	
-	E40-0574-05	PIN CONNECTOR(5P)	
-	E40-0673-05	PIN CONNECTOR(6P)	
-	E40-0773-05	PIN CONNECTOR(7P)	
-	E40-0873-05	PIN CONNECTOR(8P)	
-	L79-0147-05	FILTER *	E E
CF1	L72-0128-05	CERAMIC FILTER	E E
CF1 ,2	L72-0138-05	CERAMIC FILTER K	UX
CF2	L72-0133-05	CERAMIC FILTER	E E
CF3	L72-0096-05	CERAMIC FILTER	
CF4	L72-0151-05	CERAMIC FILTER	*
L1	L19-0026-05	BALUN TRANSFORMER K	UX
L2	L40-2292-11	INDUCTOR 2.2UH	
L3	L40-1021-12	INDUCTOR 1.0MH	
L4	L30-0372-05	FM-IFT	*
L5	L32-0262-05	MW-OSC COIL	*
L6	L32-0263-05	LW-OSC COIL	*E
L8	L40-1021-12	INDUCTOR 1.08MH	E
L9	L79-0074-05	FILTER (LPF)	E
L10	L30-0321-05	AM-IFT	
L16	L40-1021-12	INDUCTOR 1.0MH	
L18	L40-1021-12	INDUCTOR 1.0MH	
L20	L40-1021-12	INDUCTOR 1.0MH	
L21 ,22	L40-5611-13	INDUCTOR 560UH	
L23 ,24	L40-1021-12	INDUCTOR 1.0MH	
L25	L40-2211-25	INDUCTOR 220UH	
L26	L32-0264-05	CLOCK OSC COIL	*
X1	L77-0573-05	CRYSTAL RESONATOR 4.5MH	
CP1	R90-0161-05	MULTIPLE COMPONENTS	*
CP2	R90-0176-05	MULTIPLE COMPONENTS	*
CP3	R90-0140-05	MULTIPLE COMPONENTS	
CP4	R90-0178-05	MULTIPLE COMPONENTS	*
CP5	R90-0132-05	MULTIPLE COMPONENTS	
CP6	R90-0180-05	MULTIPLE COMPONENTS	*
CP7	R90-0181-05	MULTIPLE COMPONENTS	*
CP8	R90-0179-05	MULTIPLE COMPONENTS	*
CP9	R90-0176-05	MULTIPLE COMPONENTS	*
R33	R92-0210-05	FUSE RESISTOR 33	E E
R38	R92-0210-05	FUSE RESISTOR 33	E E
RL1	S51-2408-05	RELAY	*E
S1 101	S31-2056-05	SLIDE SWITCH(CH SPACE)U	

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
S2 102	S31-2067-05	SLIDE SWITCH(TIMER)	*
L7 103	T90-0115-05	BAR ANTENNA(MW) *KU	XE
L7 103	T90-0116-05	BAR ANTENNA(MW,LW)	E
104 3D	V40-7700-70	7D8A *KU	XE
104 3D	V40-7700-80	7G8A	*E
D1	V11-0076-05	1S1555	
D1	V11-0271-05	1S2076	
D2 -5	V11-0076-05	1S1555	E
D2 -5	V11-0271-05	1S2076	E
D6	V11-3178-76	KV1236(Z2)	
D8 ,9	V11-0076-05	1S1555	
D8 ,9	V11-0271-05	1S2076	
D16 -23	V11-0076-05	1S1555	
D16 -23	V11-0271-05	1S2076	
D24	V11-0076-05	1S1555 UX	E E
D24	V11-0271-05	1S2076 UX	E E
D25 ,26	V11-0076-05	1S1555	
D25 ,26	V11-0271-05	1S2076	
D28 -39	V11-0076-05	1S1555	
D28 -39	V11-0271-05	1S2076	
D71 -83	V11-0076-05	1S1555	
D71 -83	V11-0271-05	1S2076	
D83 -87	V11-0271-05	1S2076	
D85 -87	V11-0076-05	1S1555	
D88	V11-4111-90	XZ-041	
D89	V11-0076-05	1S1555	
D89	V11-0271-05	1S2076	
D90	V11-0290-05	V03C	
D91	V11-0076-05	1S1555	
D91	V11-0271-05	1S2076	
D92 ,93	V11-0295-05	W06B	
D94	V11-4111-90	XZ-041	
D95 ,96	V11-0076-05	1S1555	E
D95 ,96	V11-0271-05	1S2076	E
D97	V11-0076-05	1S1555	
D97	V11-0271-05	1S2076	
D98	V11-0051-05	1N60	
D99 -100	V11-0219-05	V06B	
D101	V11-0295-05	W06B	
IC1	V30-0192-05	HA1137W-05	
IC2	V30-0519-10	LA1245	
IC3	V30-0626-10	UPB553AC	
IC4	V30-0609-10	UPD1703C-016	
IC5	V30-0614-10	MB74LS42M	
IC6	V30-0652-10	UPD4035C	
IC7 ,8	V30-1029-16	UPC78L05	
IC9	V30-0653-10	UPD651C-23	
IC10	V30-0355-10	DN6838	
Q2	V03-0945-51	2SC945(A)(Q,P)	E
Q2	V03-1685-20	2SC1685(R,S)	E
Q3	V09-0127-40	2SK105(H,J)	E
Q6 -15	V03-0945-51	2SC945(A)(Q,P)	
Q6 -15	V03-1685-20	2SC1685(R,S)	
Q16	V03-0945-51	2SC945(A)(Q,P)	E
Q16	V03-1685-20	2SC1685(R,S)	E
Q17	V03-0945-51	2SC945(A)(Q,P)	
Q17	V03-1685-20	2SC1685(R,S)	
Q18	V03-0945-51	2SC945(A)(Q,P) UX	E E
Q18	V03-1685-20	2SC1685(R,S) UX	E E
Q19	V03-0945-51	2SC945(A)(Q,P)	
Q19	V03-1685-20	2SC1685(R,S)	

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
Q20 -24	V01-0733-40	2SA733(A)(Q,P)	
Q20 -24	V01-1127-30	2SA1127NC(R,S)	
Q25 -28	V03-0945-51	2SC945(A)(Q,P)	
Q25 -28	V03-1685-20	2SC1685(R,S)	
Q29	V01-0733-40	2SA733(A)(Q,P)	
Q29	V01-1127-30	2SA1127NC(R,S)	
Q30 -33	V03-0945-51	2SC945(A)(Q,P)	
Q30 -33	V03-1685-20	2SC1685(R,S)	
Q41 -46	V03-0945-51	2SC945(A)(Q,P)	
Q41 -46	V03-1685-20	2SC1685(R,S)	
Q47	V01-0733-40	2SA733(A)(Q,P)	
Q47	V01-1127-30	2SA1127NC(R,S)	
Q48 -62	V03-0945-51	2SC945(A)(Q,P)	
Q48 -62	V03-1685-20	2SC1685(R,S)	
Q63 ,64	V04-0592-30	2SD592NC(Q,R,S)	
Q65 -67	V03-0945-51	2SC945(A)(Q,P)	
Q65 -67	V03-1685-20	2SC1685(R,S)	
Q68	V04-0592-30	2SD592NC(Q,R,S)	
Q69	V03-0945-51	2SC945(A)(Q,P)	
Q69	V03-1685-20	2SC1685(R,S)	
	W02-0031-05	FM FRONT END	
AUDIO	**K:X09-1750-10 U:X09-1750-81 🄴:X09-1752-72** **X:X09-1750-71 E:X09-1752-71**		
D10 ,11	B30-0312-05	LED	*
C1 ,2	C24-1210-69	ELECTRO 10UF 16WV	
C3 ,4	C52-1747-16	CERAMIC 470PF K	
C5 ,6	C52-2710-26	CERAMIC 0.001UF K	
C7 ,8	C24-1010-79	ELECTRO 100UF 10WV	
C9 ,10	C46-1722-25	MYLAR 0.0022UF J	
C11 ,12	C46-1782-25	MYLAR 0.0082UF J	
C13 ,14	C24-1710-59	ELECTRO 1UF 50WV	
C15 ,16	C24-1047-69	ELECTRO 47UF 10WV	
C17 ,18	C24-1710-59	ELECTRO 1UF 50WV	
C19 ,20	C52-1747-16	CERAMIC 470PF K	
C21 ,22	C52-2710-26	CERAMIC 0.001UF K	
C23 ,24	C24-1210-69	ELECTRO 10UF 16WV	
C25 ,26	C71-1710-02	CERAMIC 10PF D	
C27 ,28	C24-1210-69	ELECTRO 10UF 16WV	
C29 ,30	C24-1047-69	ELECTRO 47UF 10WV	
C31 ,32	C46-1727-36	MYLAR 0.027UF K	
C33 ,34	C24-1210-69	ELECTRO 10UF 16WV	
C37 ,38	C24-1747-57	ELECTRO 4.7UF 50WV	
C39 ,40	C46-1710-35	MYLAR 0.01UF J	
C41 ,42	C46-1710-45	MYLAR 0.1UF J	
C43 ,44	C46-1722-25	MYLAR 0.0022UF J	
C45 ,46	C46-1727-36	MYLAR 0.027UF K	
C47 ,48	C24-1747-49	ELECTRO 0.47UF 50WV	
C49 ,50	C71-1722-15	CERAMIC 220PF J	
C51 ,52	C24-1010-79	ELECTRO 100UF 10WV	
C53 ,54	C24-1210-87	ELECTRO 1000UF 16WV	
C56 ,57	C46-1710-45	MYLAR 0.1UF J	
C58	C24-1210-87	ELECTRO 1000UF 16WV	
C59 -61	C24-1010-79	ELECTRO 100UF 10WV	
C62 -64	C24-1247-69	ELECTRO 47UF 16WV	
C65	C24-1722-57	ELECTRO 2.2UF 50WV	
C66	C24-1722-57	ELECTRO 2.2UF 50WV	E🄴
C67	C24-1010-79	ELECTRO 100UF 10WV	
C68	C47-1747-15	POLYSTY 470PF J	
C69 ,70	C25-1710-57	LL-ELEC 1UF 50WV	
C71	C25-1722-47	LL-ELEC 0.22UF 50WV	
C72	C46-1747-35	MYLAR 0.047UF J	
C74	C24-1010-79	ELECTRO 100UF 10WV	

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
C75 ,76	C46-1715-35	MYLAR 0.015UF J	XU🄴
C75 ,76	C46-1722-35	MYLAR 0.022UF J	K
C77 ,78	C46-1733-25	MYLAR 0.0033UF J	
C79 ,80	C71-1739-16	CERAMIC 390PF J	
C81 ,82	C46-1715-26	MYLAR 0.0015UF K	
C83 -86	C24-1710-59	ELECTRO 1UF 50WV	
C87	C24-1210-79	ELECTRO 100UF 16WV	
C88	C24-6547-57	ELECTRO 4.7UF 35WV	
C89 ,90	C24-1210-69	ELECTRO 10UF 16WV	
C91 ,92	C24-1710-59	ELECTRO 1UF 50WV	
C93 ,94	C24-1747-49	ELECTRO 0.47UF 50WV	
C102	C24-1010-79	ELECTRO 100UF 10WV	
C103,104	C46-1782-25	MYLAR 0.0082UF J	
C110,90	C24-1210-69	ELECTRO 10UF 16WV	
C115	C46-1710-45	MYLAR 0.1UF J	
C116	C24-1033-71	ELECTRO 330UF 10WV	
C120	C24-1210-69	ELECTRO 10UF 16WV	
-	E40-0273-05	PIN CONNECTOR(2P)	
-	E40-0373-05	PIN CONNECTOR(3P)	
-	E40-0573-05	PIN CONNECTOR(5P)	
-	E40-0673-05	PIN CONNECTOR(6P)	
-	E40-0773-05	PIN CONNECTOR(7P)	
201 3C	E11-0090-05	PHONE JACK (3P)	*
202 3C	E11-0091-05	PHONE JACK (2P)	*
203 1D	E13-0434-05	PHONO JACK (4P)	*
L1	L40-1021-11	INDUCTOR 1.0MH	
L2	L79-0125-05	FILTER BPF	E🄴
VR1 204	R06-5077-05	POTENTIOMETER(MIC MIX)	
VR2 205	R01-5036-05	POTENTIOMETER(BALANCE)	
VR3 206	R10-5005-05	POTENTIOMETER(VOLUME)	
VR4,5 207	R29-4001-05	POTENTIOMETER(TONE)	
VR6	R12-3057-05	TRIMMING POT 10K(VCO)	
S1 208	S40-2133-05	PUSH SWITCH(POWER)	*
S2 209	S42-2054-05	PUSH SWITCH(2KEY)LOU,AC	*
S3 210	S42-5027-05	PUSH SWITCH(5KEY) *KU	EX
S3 210	S42-6011-05	PUSH SWITCH(6KEY)	*🄴
S4 211	S31-2056-05	SLIDE SWITCH(INT-SPKR)	
S5 212	S31-2056-05	SLIDE SWITCH(EMPHASIS)	*U
D2	V11-4175-36	WZ-096	
D3	V11-0076-05	1S1555	
D3	V11-0271-05	1S2076	
D7	V11-0076-05	1S1555	
D7	V11-0271-05	1S2076	
D8	V11-4163-46	XZ-080	
D12	V11-4103-60	XZ-051	
D13 ,14	V11-0076-05	1S1555	
D13 ,14	V11-0271-05	1S2076	
IC1 ,2	V30-0353-10	AN6551	
IC3	V30-0645-10	HA1374A	
IC4	V30-0646-10	KB4424A	
IC5	V30-0516-10	MB84066B	
Q1 ,2	V03-0945-51	2SC945(A)(Q,P)	
Q1 ,2	V03-1685-20	2SC1685(R,S)	
Q3 ,4	V03-1845-60	2SC1845(1)(E,F)	
Q3 ,4	V03-2378-20	2SC2378(Q,P,K)	
Q5 ,6	V04-0592-30	2SD592NC(Q,R,S)	
Q7	V04-0313-50	2SD313T-AL(E)	
Q8	V03-0945-51	2SC945(A)(Q,P)	E🄴
Q8	V03-1685-20	2SC1685(R,S)	E🄴
Q9	V03-0945-51	2SC945(A)(Q,P)	

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
Q9	V03-1685-20	2SC1685(R,S)	
Q10 -13	V03-0945-51	2SC945(A)(Q,P)	
Q10 -13	V03-1685-20	2SC1685(R,S)	
Q14	V01-0733-40	2SA733(A)(Q,P)	
Q14	V01-1127-30	2SA1127NC(R,S)	
Q15 ,16	V03-0945-51	2SC945(A)(Q,P)	
Q15 ,16	V03-1685-20	2SC1685(R,S)	
Q17	V01-0733-40	2SA733(A)(Q,P)	
Q17	V01-1127-30	2SA1127NC(R,S)	
Q18 -21	V03-0945-51	2SC945(A)(Q,P)	
Q18 -21	V03-1685-20	2SC1685(R,S)	
Q24	V03-0945-51	2SC945(A)(Q,P)	
Q24	V03-1685-20	2SC1685(R,S)	

SWITCH (X13-3280-10)

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
D1 -5	B30-0258-05	LED	
-	E40-0673-05	PIN CONNECTOR(6P)	
-	E40-0773-05	PIN CONNECTOR(7P)	
-	E40-1073-05	PIN CONNECTOR(10P)	
S1 -14	S40-1040-05	PUSH SWITCH	*
S15 302	S40-2111-05	PUSH SWITCH(AUTO/MAN)	*

REC/PLAY K:X28-1410-10, E:X28-1412-71

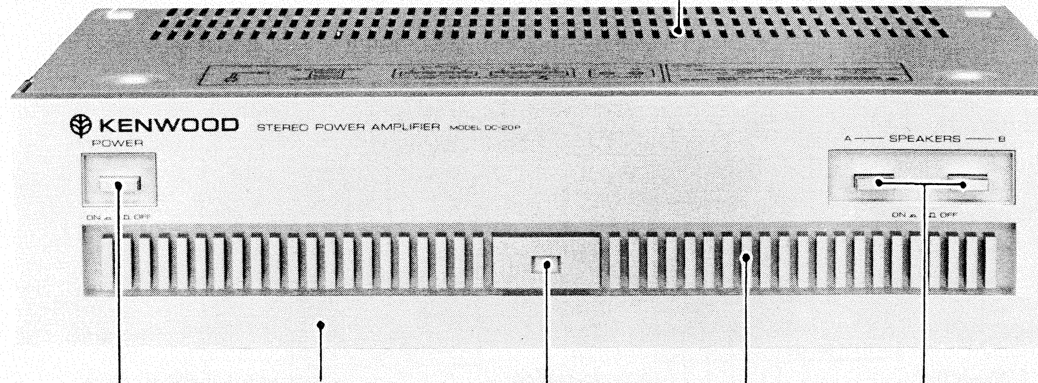
Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
C1 ,2	C52-1747-16	CERAMIC 470PF K	
C3 ,4	C25-1447-57	LL-ELEC 4.7UF 25WV	
C5 ,6	C52-1710-26	CERAMIC 0.001UF K	
C7 ,8	C24-1010-79	ELECTRO 100UF 10WV	
C9 ,10	C46-1733-35	MYLAR 0.033UF J	
C11 ,12	C24-1210-69	ELECTRO 10UF 16WV	
C13 ,14	C46-1712-35	MYLAR 0.012UF J	
C15 -18	C24-1710-59	ELECTRO 1UF 50WV	
C19 -26	C24-1210-69	ELECTRO 10UF 16WV	
C27 ,28	C24-1710-49	ELECTRO 0.1UF 50WV	
C29 ,30	C24-1733-49	ELECTRO 0.33UF 50WV	
C31 ,32	C24-1210-79	ELECTRO 100UF 16WV	
C33 ,34	C24-1022-79	ELECTRO 220UF 10WV	
C35 ,36	C24-1210-69	ELECTRO 10UF 16WV	
C37 ,38	C46-1756-25	MYLAR 0.0056UF J	
C39 ,40	C46-1747-25	MYLAR 0.0047UF J	
C41 ,42	C46-1727-35	MYLAR 0.027UF J	
C43 ,44	C46-1747-35	MYLAR 0.047UF J	
C45 ,46	C52-1768-16	CERAMIC 680PF K	
C47 ,48	C24-1210-69	ELECTRO 10UF 16WV	
C49 ,50	C24-1710-59	ELECTRO 1UF 50WV	
C51 -54	C24-1210-69	ELECTRO 10UF 16WV	
C55 ,56	C24-1747-49	ELECTRO 0.47UF 50WV	
C57 ,58	C24-1210-69	ELECTRO 10UF 16WV	
C59 ,60	C46-1710-35	MYLAR 0.01UF J	
C61 ,62	C46-1710-25	MYLAR 0.001UF J	
C63 ,64	C71-1733-16	CERAMIC 330PF K	
C65 ,66	C71-1722-15	CERAMIC 220PF J	
C67	C91-0345-05	FIXED CAPACITOR	
C68	C46-1733-25	MYLAR 0.0033UF J	
C69	C46-1722-25	MYLAR 0.0022UF J	
C70	C46-1747-25	MYLAR 0.0047UF J	
C71	C24-1710-59	ELECTRO 1UF 50WV	
C72	C24-1210-69	ELECTRO 10UF 16WV	
C73	C24-1010-79	ELECTRO 100UF 10WV	
C74	C24-1210-79	ELECTRO 100UF 16WV	
C75 ,76	C24-1033-79	ELECTRO 330UF 10WV	
C76	C24-1010-79	ELECTRO 100UF 10WV	
C77	C24-1710-59	ELECTRO 1UF 50WV	
C78	C24-1247-69	ELECTRO 47UF 16WV	
C79	C24-1210-79	ELECTRO 100UF 16WV	
C80	C24-1710-59	ELECTRO 1UF 50WV	
C81	C52-1747-16	CERAMIC 470PF K	
C82 ,83	C24-1733-49	ELECTRO 0.33UF 50WV	
C84	C24-1710-49	ELECTRO 0.1UF 50WV	
C85	C24-1047-69	ELECTRO 47UF 10WV	
C86	C24-1710-49	ELECTRO 0.1UF 50WV	
C87	C24-1710-59	ELECTRO 1UF 50WV	
C89	C49-2015-25	POLYSTYRENE CAPACITOR	
C90	C49-2033-25	MYLAR 0.0033UF J	
C91 ,92	C46-1712-35	MYLAR 0.012UF J	
C93 ,94	C46-1727-35	MYLAR 0.027UF J	
C95 ,96	C46-1739-35	MYLAR 0.039UF J	
C97 ,98	C46-1733-35	MYLAR 0.033UF J	
C99	C46-1710-35	MYLAR 0.01UF J	
C100	C71-1710-15	CERAMIC 100PF J	
C101,102	C24-1210-79	ELECTRO 100UF 16WV	
C103	C55-1710-38	CERAMIC 0.01UF Z	
C104	C24-1222-79	ELECTRO 220UF 16WV	
C105	C24-1210-69	ELECTRO 10UF 16WV	
C106,107	C55-1710-38	CERAMIC 0.01UF Z	
C108	C24-6510-77	ELECTRO 100UF 35WV	
C109	C24-1410-79	ELECTRO 100UF 25WV	
C110,111	C24-1447-69	ELECTRO 47UF 25WV	
C112,113	C24-1447-69	ELECTRO 47UF 25WV	
C114	C24-1047-69	ELECTRO 47UF 10WV	
C115	C24-1410-79	ELECTRO 100UF 25WV	
C116,117	C24-1447-69	ELECTRO 47UF 25WV	
-	E40-0373-05	PIN CONNECTOR(3P)	
-	E40-0673-05	PIN CONNECTOR(6P)	
-	E40-0773-05	PIN CONNECTOR(7P)	
L1 ,2	L39-0304-05	TRAP COIL 10MH	
L3 ,4	L79-0144-05	LC FILTER	*
L5 ,6	L40-8225-28	INDUCTOR 8.2MH	
L7	L32-0260-05	OSCILLATING COIL	*
L8	L40-1511-25	INDUCTOR 150UH	
L9	L19-0030-05	TRNSFORMER	*
L10 ,11	L40-5611-12	INDUCTOR 560UH	
L12 -14	L40-1021-12	INDUCTOR 1.0MH	
L16	L40-1021-12	INDUCTOR 1.0MH	
L18	L40-1021-12	INDUCTOR 1.0MH	
R55 ,56	R43-1233-05	FL-PROOF RD33 J 2E	
R131	R43-1212-05	FL-PROOF RD12 J 2E	
R132,133	R43-1210-05	FL-PROOF RD10 J 2E	
R146	R43-1213-15	FL-PROOF RD130 J 2E	
VR1 -4	R12-4302-05	TRIMMING POT 50K	
VR5 ,6	R12-5302-05	TRIMMING POT 100K	
S1 401	S31-2059-05	SLIDE SWITCH(BEAT CANCEL)	
S2 402	S42-4017-05	PUSH SWITCH(4KEY)TAPE	*
D1 ,2	V11-0051-05	1N60	
D3 -15	V11-0076-05	1S1555	
D3 -15	V11-0271-05	1S2076	
D16	V11-4175-16	WZ-052	
D17	V11-4167-06	XZ-090	
IC1	V30-0651-10	UPC1032H	*
IC2	V30-0353-10	AN6551	
IC3 ,4	V30-0648-10	NE646N	*
Q1 -4	V03-1845-10	2SC1845(F,E)	
Q5 -10	V03-0945-51	2SC945(A)(Q,P)	
Q5 -10	V03-1685-20	2SC1685(R,S)	

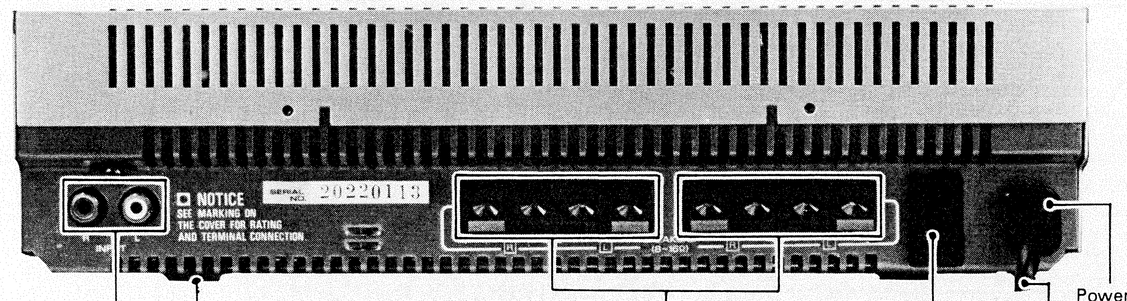
PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
Q11 ,12	V03-1845-10	2SC1845(F,E)	
Q13 -21	V03-0945-51	2SC945(A)(Q,P)	
Q13 -21	V03-1685-20	2SC1685(R,S)	
Q22	V01-0733-40	2SA733(A)(Q,P)	
Q22	V01-1127-30	2SA1127NC(R,S)	
Q23 ,24	V03-0945-51	2SC945(A)(Q,P)	
Q23 ,24	V03-1685-20	2SC1685(R,S)	
Q25	V01-0992-10	2SA992(F,E)	
Q26	V01-0733-40	2SA733(A)(Q,P)	
Q26	V01-1127-30	2SA1127NC(R,S)	
Q27	V03-0945-51	2SC945(A)(Q,P)	
Q27	V03-1685-20	2SC1685(R,S)	
Q28	V01-0733-40	2SA733(A)(Q,P)	
Q28	V01-1127-30	2SA1127NC(R,S)	
Q29 -31	V03-0945-51	2SC945(A)(Q,P)	
Q29 -31	V03-1685-20	2SC1685(R,S)	
Q32	V03-1845-10	2SC1845(F,E)	
Q33 -36	V03-0945-51	2SC945(A)(Q,P)	
Q33 -36	V03-1685-20	2SC1685(R,S)	
Q37	V04-0592-30	2SD592NC(Q,R,S)	
Q38 ,39	V03-0373-05	2SC1384(Q,R)	
Q40 ,41	V04-0592-30	2SD592NC(Q,R,S)	
AD-12			
501 3B	NO STOCK	METALLIC CABINET	
502 3B	NO STOCK	MAIN CHASSIS	
503 3B	E03-0047-05	AC INLET	
504 3B	L01-2461-05	POWER TRANSFORMER *	KP
504 3B	L01-2462-05	POWER TRANSFORMER	*T
504 3B	L01-2465-05	POWER TRANSFORMER	*U
504 3B	L01-2466-05	POWER TRANSFORMER	*E
-	S31-2053-05	SLIDE SWITCH(POWER SEL)	UE
505 3B	X00-2180-10	POWER SUPPLY PCB ASSY	*K
505 3B	X00-2180-81	POWER SUPPLY PCB ASSY	*U
505 3B	X00-2181-01	POWER SUPPLY PCB ASSY	*P
505 3B	X00-2182-71	POWER SUPPLY PCB ASSY	*E
POWER SUPPLY	K:X00-2180-10 P:X00-2181-01 U:X00-2180-81 E:X00-2182-71		
C1	C91-0023-05	CERAMIC 0.01UF AC250V	U
C1	C91-0079-05	CERAMIC 0.01UF AC125V	KPE
C2	C55-1710-38	CERAMIC 0.01UF Z	
C3 ,4	C90-0562-05	ELECTRO 2200UF 25WV	*
C5	C24-1410-79	ELECTRO 100UF 25WV	
C6	C24-1010-79	ELECTRO 100UF 25WV	K
C7	C24-1210-79	ELECTRO 100UF 25WV	
C8	C55-1710-38	CERAMIC 0.01UF Z	
C9	C55-1710-38	CERAMIC 0.01UF Z	E
-	F05-2521-05	FUSE 250V 2.5A	U
-	F05-2525-05	FUSE 250V T2.5A	E
-	F06-5014-05	FUSE 250V 0.5A	KP
-	J13-0041-05	FUSE CLIP K	UP
-	J13-0054-05	FUSE CLIP	E
D1	V11-2400-20	W02	
D2	V11-4109-90	EZ-056	
Q1 ,2	V04-0330-20	2SD330(E,F)	
Q3 ,4	V03-0945-90	2SC945(A)	
Q5	V03-0945-90	2SC945(A)	K
FM FRONT END (W02-0031-05)			
D1 -4	V11-2103-50	1SV55	
Q1	V09-0150-10	3SK85	
Q2	V03-2668-16	2SC2668	

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
Q3	V09-0121-10	2SK55(E)	
Q4	V09-0124-20	2SK61(Y)	
MECHANISM ASSY (D40-0237-05)			
701 3F	NO STOCK	CHASSIS	
702 3E	NO STOCK	HEAD BASE	
703 2E	NO STOCK	SUB CHASSIS	
704 3E	NO STOCK	BASE STOPPER PLATE	
705 3E	NO STOCK	STOPPER(A)SPRING	
706 3E	NO STOCK	STOPPER(B)	
707 3F	NO STOCK	BRAKE PLATE	
708 2F	NO STOCK	SPRING PLATE	
709 2F	NO STOCK	BRAKE RELEASE LEVER	
710 9F	NO STOCK	PULLEY	
711 2E,2F	NO STOCK	CAP	
712 3F	NO STOCK	PLAY LEVER(1)	
713 3F	NO STOCK	PLAY LEVER(2)	
714 2F	NO STOCK	PLAY LEVER(3)	
715 3F	NO STOCK	LEVER ASSY	
716 1E	NO STOCK	CUSHION	
717 2E	NO STOCK	FF/REW LINK	
718 2E	NO STOCK	SOLENOID SPRING(A)	
719 2E	NO STOCK	SOLENOID SPRING(B)	
720 2F	NO STOCK	STOPPER(A)	
721 2F	NO STOCK	PLATE SPRING	
722 2F	NO STOCK	STOPPER SPRING(B)	
723 1F,2F	NO STOCK	CAM GEAR	
724 1E	NO STOCK	FF LEVER	
725 1B	NO STOCK	REW LEVER	
726 1F	NO STOCK	LEVER HOLDER	
727 1F	NO STOCK	CAM ASSY	
728 1F	NO STOCK	COLLAR	
729 1F	NO STOCK	FF/REW LEVER ASSY	
730 3E	NO STOCK	ANTI-ERASE LEVER	
741 3F	D01-0040-08	FLYWHEEL	*
742 3E	D03-0206-08	REEL DISK ASSY	*
743 2F	D13-0073-08	FF/REW GEAR ASSY	*
744 3F	D14-0070-08	PINCH ROLLER	*
745 2F	D15-0189-08	PULLEY	*
746 3F	D16-0069-08	MAIN BELT	*
747 2F	D16-0070-08	REEL BELT	*
748 2F	D19-0059-08	PLAY CLUTCH ASSY	*
749 3E	D90-0022-08	STEAL BALL	*
750 3E	D90-0023-08	STEAL BALL	*
751 3E	G01-0395-08	AZIMUTH SPRING	*
752 3E	G01-0454-08	PINCH ROLLER SPRING	*
753 3E	G01-0455-08	BACK TENTION SPRING	*
754 3F	G01-0456-08	BRAKE SPRING	*
755 2F	G01-0457-08	PLAY CLUTCH SPRING	*
756 1E,1F	G01-0458-08	LEVER SPRING	*
757 1E	G01-0459-08	PLAY LEVER SPRING	
758 3E	N09-0391-08	HEAD SCREW	*
759 1E	N09-0392-08	F LOCK SCREW	*
760 1F	S46-1014-08	SW OPERATIONAL PLATE	*
761 3E	S50-1023-08	SENSITIVE SWITCH	*
762 3E	T32-0302-08	ERASE HEAD	*
763 3E	T34-0302-08	REC/PLAY HEAD	*
764 1E	T42-0012-08	DC MOTOR	*
765 2E	T94-0021-08	SOLENOID(BLUE)	*
766 2E	T94-0022-08	SOLENOID(RED)	*

DC-20P


Metalic cabinet
(A01-0414-03)
KENWOOD STEREO POWER AMPLIFIER MODEL DC-20P
POWER
A —— SPEAKERS —— B
Knob
(K27-0632-04)
Front panel*
(A20-)
LED
(B30-0301-05)
Sub panel
(A22-0302-02)
Knob
(K27-0632-04)


NOTICE
SEE MARKING ON THE COVER FOR RATING AND TERMINAL CONNECTION.
SERIAL NO. 20220113
Power cord bushing*
PJ42-)
Phono jack
(E13-0215-05)
Foot
(J02-0109-05)
Terminal board
(E20-0448-05)
AC outlet*
(E03-)
Power cord*
(E30-)

* Refer to Parts List.

ADJUSTMENT

IDLE CURRENT

In this model, fixed resistor R45 (R46) and R47 (R48) are used, instead of a trimming potentiometer, to adjust the idle current to 20 ~ 120 mA. Some units employ R45 (R46) or R47 (R48) and some units employ both R45 (R46) and R47 (R48).

When replacing the power or drive transistors, always check that the idle current is 20 ~ 120 mA.

REGLAGES

COURANT DE POLARISATION

Ce modèle est équipé des résistors non réglables R45 (R46) et R47 (R48), au lieu d'un potentiomètre trimmer, pour régler le courant de polarisation sur 20 ~ 120 mA. Certains dispositifs sont équipés de R45 (R46) ou R47 (R48) et d'autres sont équipés à la fois de R45 (R46) et R47 (R48).

Lors du remplacement du transistor d'alimentation ou du transistor d'entraînement, toujours s'assurer que le courant de polarisation est de 20 ~ 120 mA.

ABGLEICH

LEERLAUFSTROM

Dieses Modell ist mit Festwiederstand R45 (R46) und R47 (R48) ausgestattet, an Stelle von einem Trimmpotentiometer, um den Leerlaufstrom auf 20 ~ 120 mA einzustellen. Einige Modelle sind mit R45 (R46) und R47 (R48) zusammen.

Beim Wechseln des Krafttransistors oder des Antriebstransistors, vergewissern Sie sich immer daß der Leerlaufstrom 20 ~ 120 mA ist.

<CHECKING PROCEDURE>

(1) Set the volume control to a minimum.

(2) Connect a DC voltmeter between the emitter of Q15 (Q16) and the collector of Q17 (Q18).

(3) Confirm that the DC voltmeter reading is 8.8 ~ 52.8 mV.

(4) If the DC voltmeter reading is not as specified, change the resistance of R45 (R46) and/or R47 (R48) to obtain the specified value.

<METHODE DE VERIFICATION>

(1) Régler le contrôle du volume sur le minimum.

(2) Connecter un voltmètre CC entre l'émetteur de Q15 (Q16) et le collecteur de Q17 (Q18).

(3) S'assurer que la lecture du voltmètre CC indique 8,8 ~ 52,8 mV.

(4) Si la lecture du voltmètre CC n'est pas comme spécifiée, changer la résistance de R45 (R46) et/ou R47 (R48) pour obtenir la valeur spécifiée.

<PRÜFUNGSGANG>

(1) Den Lautstärke knopf aufs Minimum stellen.

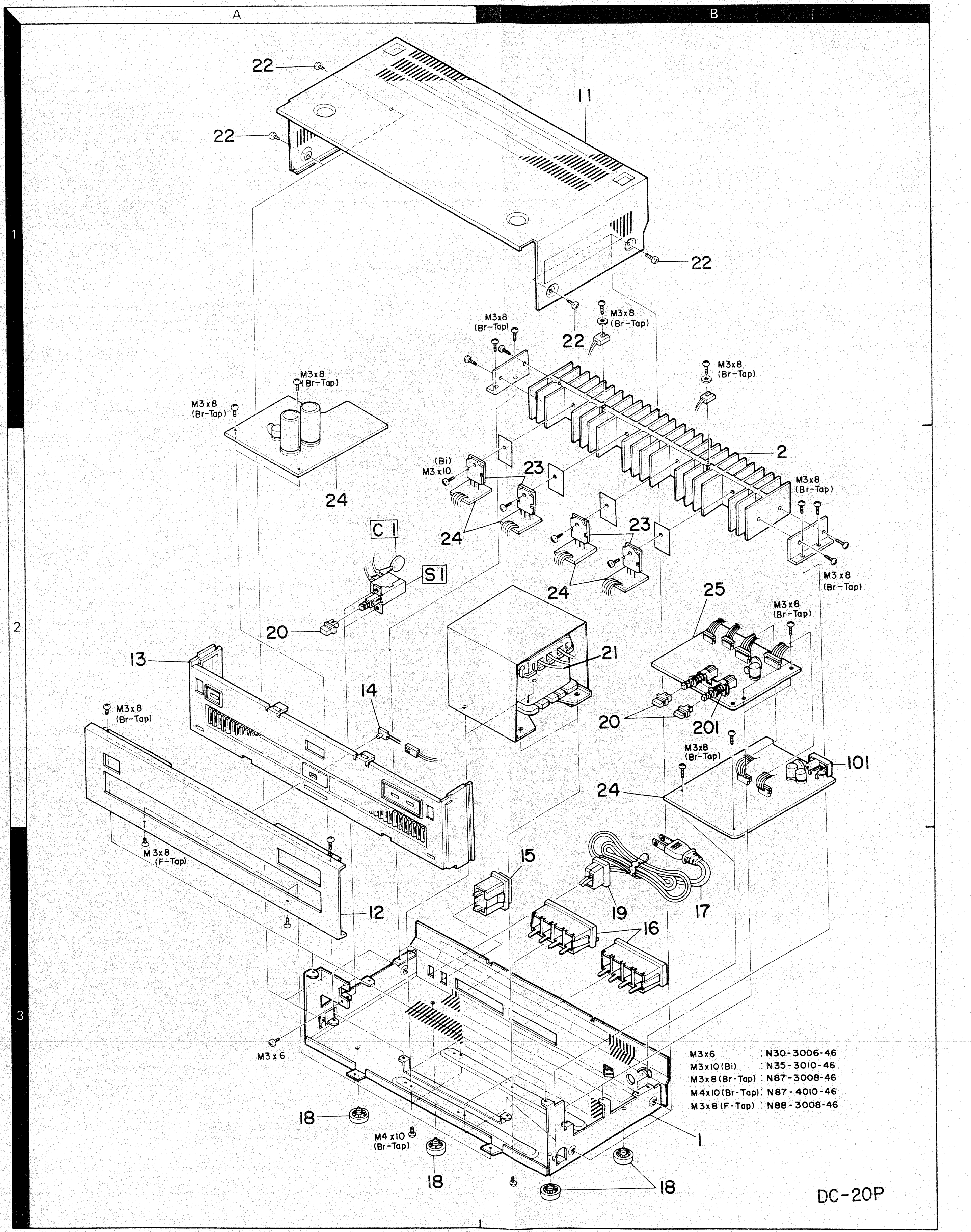
(2) Einen Gleichspannungsmesser zwischen den Emitter von Q15 (Q16) und den kollektor von Q17 (Q18).

(3) Sich vergewissern, daß der Gleichspannungsmesser 8,8 ~ 52,8 mV.

(4) Falls die Anzeige des Gleichspannungsmesser nicht wie angegeben ist, dem Widerstand von R45 (R46) und/ oder R47 (R48) ändern um den angegebenen Wert zu erhalten.

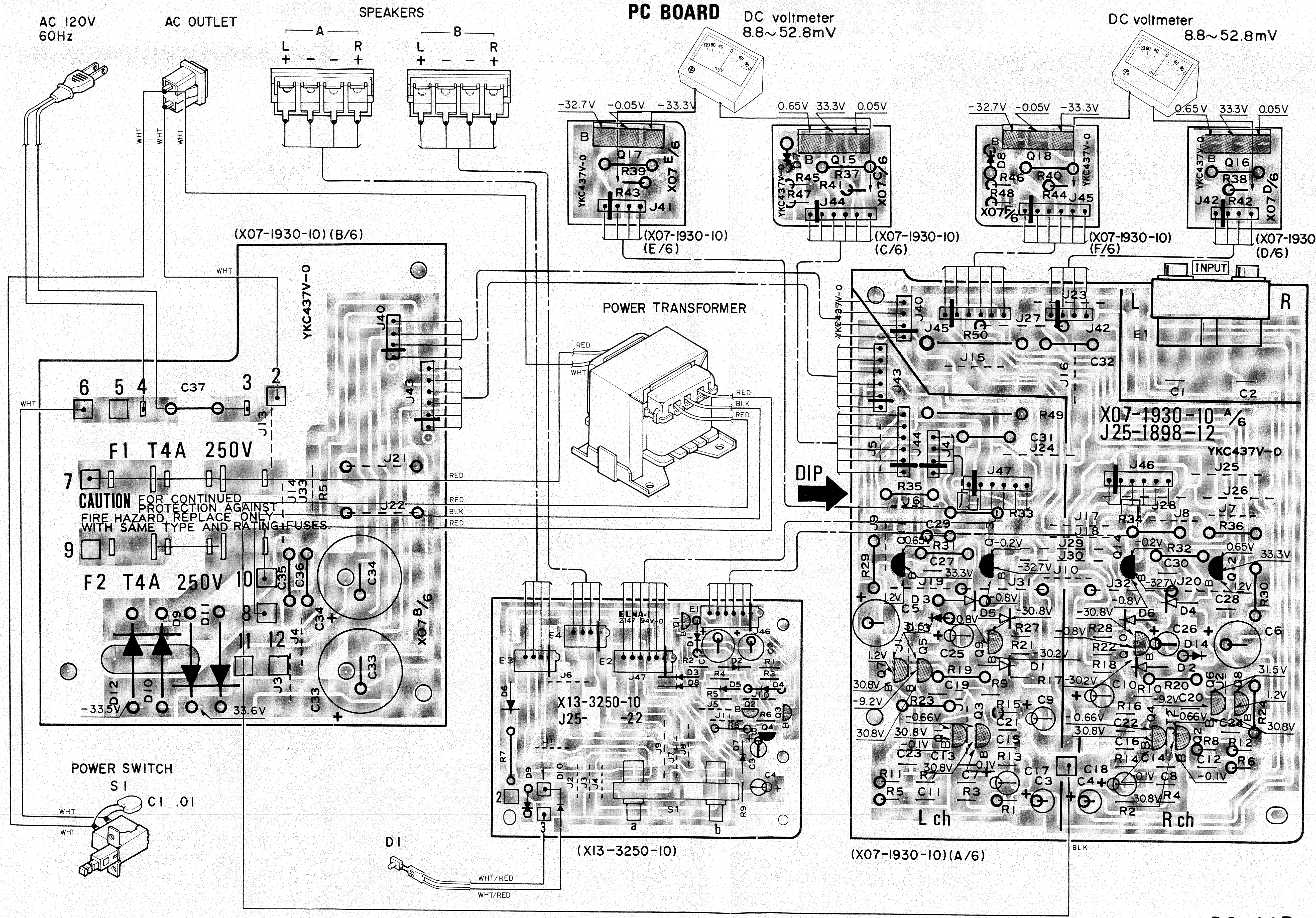
EXPLODED VIEW

Refer to Parts List on page 68.


A
B
1
2
3
22
22
11
22
22
M3x8 (Br-Tap)
M3x8 (Br-Tap)
M3x8 (Br-Tap)
M3x8 (Br-Tap)
M3x8 (Br-Tap)
2
(Bi) M3x10
23
23
24
24
24
24
CI
SI
M3x8 (Br-Tap)
M3x8 (Br-Tap)
20
13
25
M3x8 (Br-Tap)
21
14
M3x8 (Br-Tap)
20
201
M3x8 (Br-Tap)
101
24
M3x8 (F-Tap)
15
12
19
17
16
M3x6
18
M4x10 (Br-Tap)
18
1
18
M3x6 : N30-3006-46
M3x10(Bi) : N35-3010-46
M3x8(Br-Tap) : N87-3008-46
M4x10(Br-Tap) : N87-4010-46
M3x8(F-Tap) : N88-3008-46
DC-20P

DC-20P DC-20P

PC BOARD


AC 120V
60Hz
AC OUTLET
SPEAKERS
A
B
L
R
DC voltmeter
8.8~52.8mV
-32.7V
-0.05V
-33.3V
0.65V
33.3V
0.05V
Q17
Q15
Q18
Q16
R39
R43
J41
R45
R41
R37
R47
J44
R46
R40
R48
R44
J45
R38
R42
J42
(X07-1930-10)
(E/6)
(C/6)
(F/6)
(D/6)
YKC437V-0
(X07-1930-10) (B/6)
POWER TRANSFORMER
RED
WHT
BLK
WHT
J40
J43
J21
J22
C37
F1 T4A 250V
F2 T4A 250V
CAUTION FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND RATING FUSES.
C34
C33
C35
C36
D9
D10
D11
D12
-33.5V
33.6V
X07 B/6
DIP
INPUT
L
R
E1
C1
C2
X07-1930-10 A/6
J25-1898-12
YKC437V-0
J23
J27
R50
J15
J16
C32
R49
C31
J24
J47
J46
J25
J26
J28
R35
J6
R33
J17
J18
R34
J8
J7
R36
C29
J9
R31
R32
C27
C30
J29
J30
J10
J19
J31
J32
J20
C28
R29
R30
C5
C6
D3
D4
D5
D6
R27
R28
C25
C26
D14
R21
R22
D1
D2
R19
R18
C19
R9
R17
C10
R10
R20
C20
R23
R15
C9
R16
C22
C24
R24
C21
C15
C16
C23
C13
R13
R14
C14
R8
R12
C12
R6
R11
R7
C7
C17
C3
C18
C4
C8
R5
C11
R3
R1
R2
R4
L ch
R ch
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
1.2V
30.8V
-9.2V
-0.66V
-0.1V
0.8V
-0.8V
-30.8V
-30.2V
31.5V
-0.2V
0.2V
0.1V
(X07-1930-10) (A/6)
BLK
ELNA
X13-3250-10
J25-22
E1
E2
E3
E4
J46
J47
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
S1
a
b
(X13-3250-10)
D1
WHT/RED
POWER SWITCH
S1
C1 .01
WHT

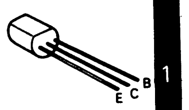
▨ Transistors

Refer to the schematic diagram for the values of capacitors and resistors.
The PC board drawing is viewed from the side easy to check.

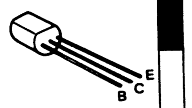
KENWOOD® STEREO POWER AMPLIFIER

When replacing transistor Q17, cut its leads shortly as possible to prevent them from touching with AC outlet.

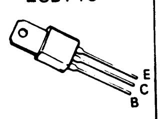
2SA733
2SA1127
2SC945
2SC1845
2SC1685

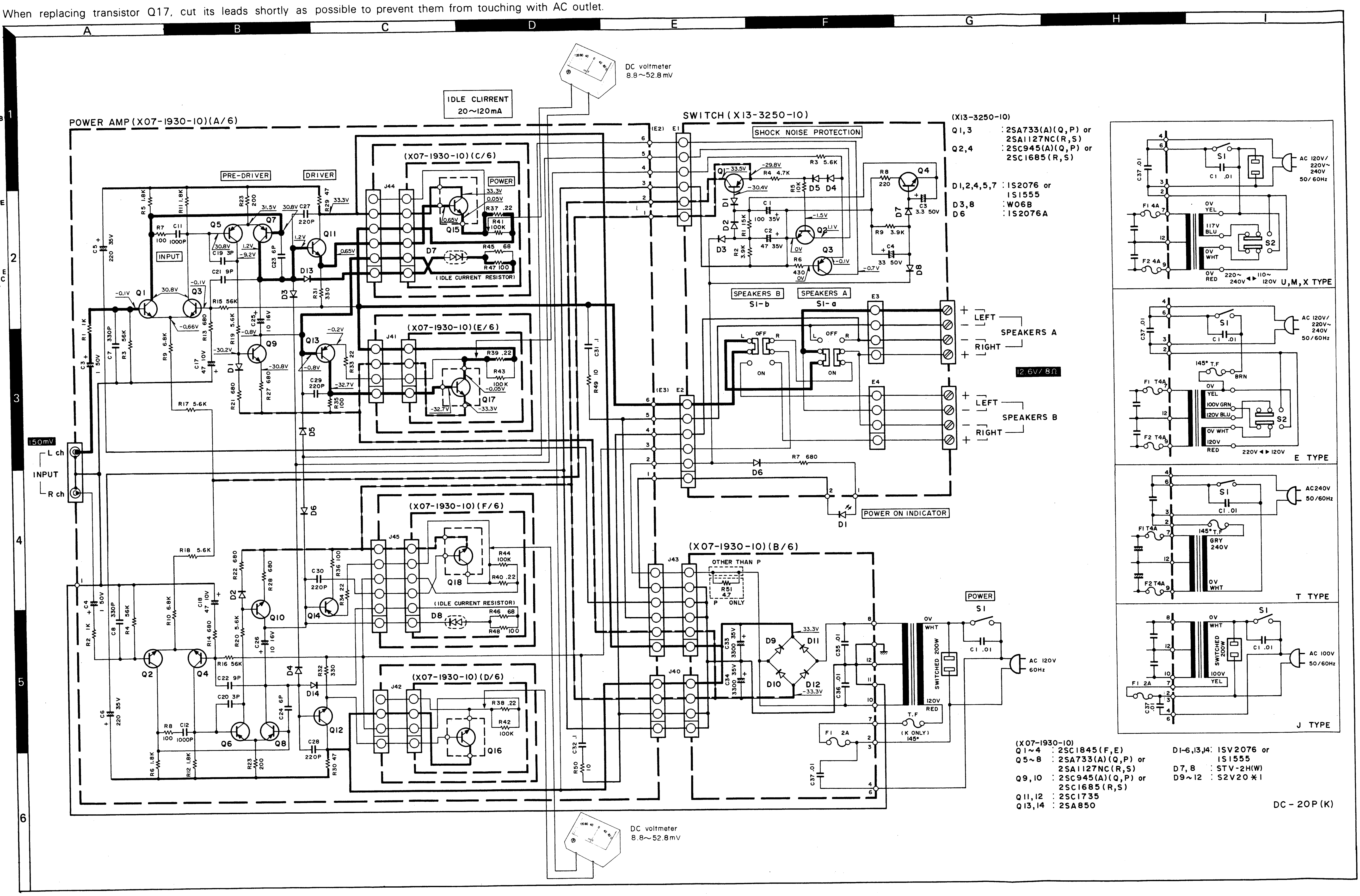


2SA850
2SC1735



2SD716




A
B
C
D
E
F
G
H
I
1
2
3
4
5
6
DC voltmeter
8.8~52.8mV
IDLE CURRENT
20~120mA
POWER AMP (X07-1930-10)(A/6)
SWITCH (X13-3250-10)
SHOCK NOISE PROTECTION
(X07-1930-10)(C/6)
(X07-1930-10)(E/6)
(X07-1930-10)(F/6)
(X07-1930-10)(D/6)
(X07-1930-10)(B/6)
PRE-DRIVER
DRIVER
POWER
INPUT
IDLE CURRENT RESISTOR
SPEAKERS B
S1-b
SPEAKERS A
S1-a
LEFT
RIGHT
SPEAKERS A
SPEAKERS B
12.6V/8Ω
150mV
L ch
R ch
INPUT
POWER ON INDICATOR
OTHER THAN P
R51 4.7
P ONLY
POWER
S1
C1 .01
AC 120V 60Hz
SWITCHED 200W
WHT
RED
T.F
(K ONLY) 145°
F1 2A
AC 120V/ 220V~ 240V 50/60Hz
117V BLU
0V YEL
0V WHT
0V RED
220~240V ◄► 110~120V U,M,X TYPE
F1 4A
F2 4A
S2
100V GRN
120V BLU
0V WHT
120V RED
BRN
145° T.F
220V ◄► 120V
E TYPE
AC240V 50/60Hz
GRY 240V
F1 T4A
F2 T4A
T TYPE
AC 100V 50/60Hz
100V YEL
J TYPE

(X13-3250-10)
Q1,3 : 2SA733(A)(Q,P) or
2SA1127NC(R,S)
Q2,4 : 2SC945(A)(Q,P) or
2SC1685(R,S)
D1,2,4,5,7 : 1S2076 or
1S1555
D3,8 : W06B
D6 : 1S2076A

(X07-1930-10)
Q1~4 : 2SC1845(F,E)
Q5~8 : 2SA733(A)(Q,P) or
2SA1127NC(R,S)
Q9,10 : 2SC945(A)(Q,P) or
2SC1685(R,S)
Q11,12 : 2SC1735
Q13,14 : 2SA850

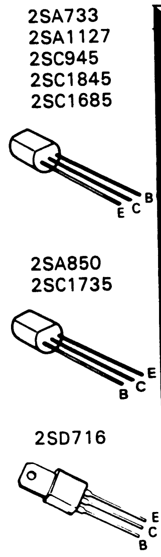
D1~6,13,14 : 1SV2076 or
1S1555
D7,8 : STV-2H(W)
D9~12 : S2V20 ✱1

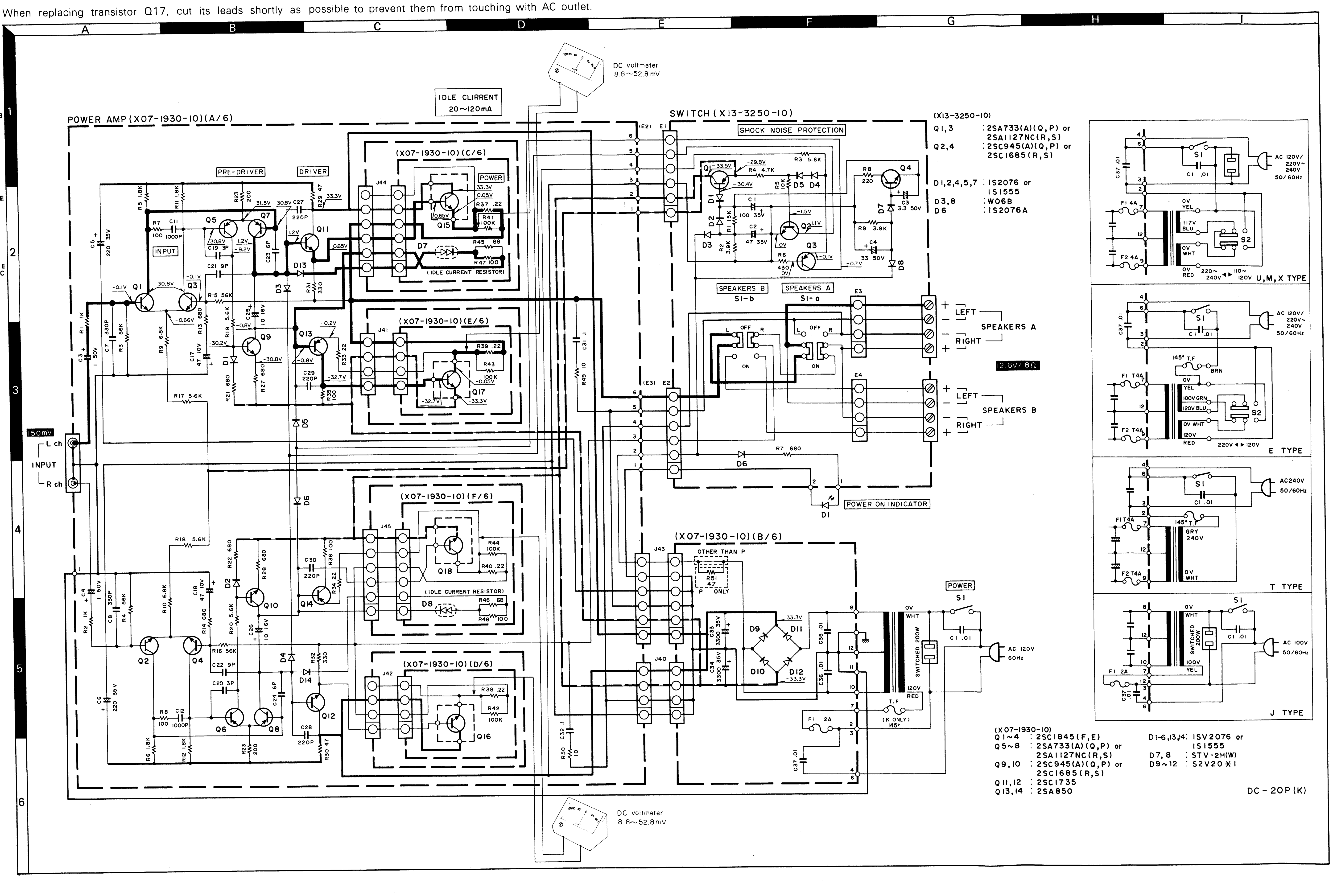
DC-20P(K)

SF
POW
Pow
20 w
40 H
Tota
rat
1/2
Inte
rat
Dam
Inpu
PO
Sign
PO
Freq
GEN
Pow
AC
Dim
Wei
* M
or
Ker
this
Ker
dév
mo
Ker
ble
●
●
●

KENWOOD® STEREO POWER AMPLIFIER

When replacing transistor Q17, cut its leads shortly as possible to prevent them from touching with AC outlet.

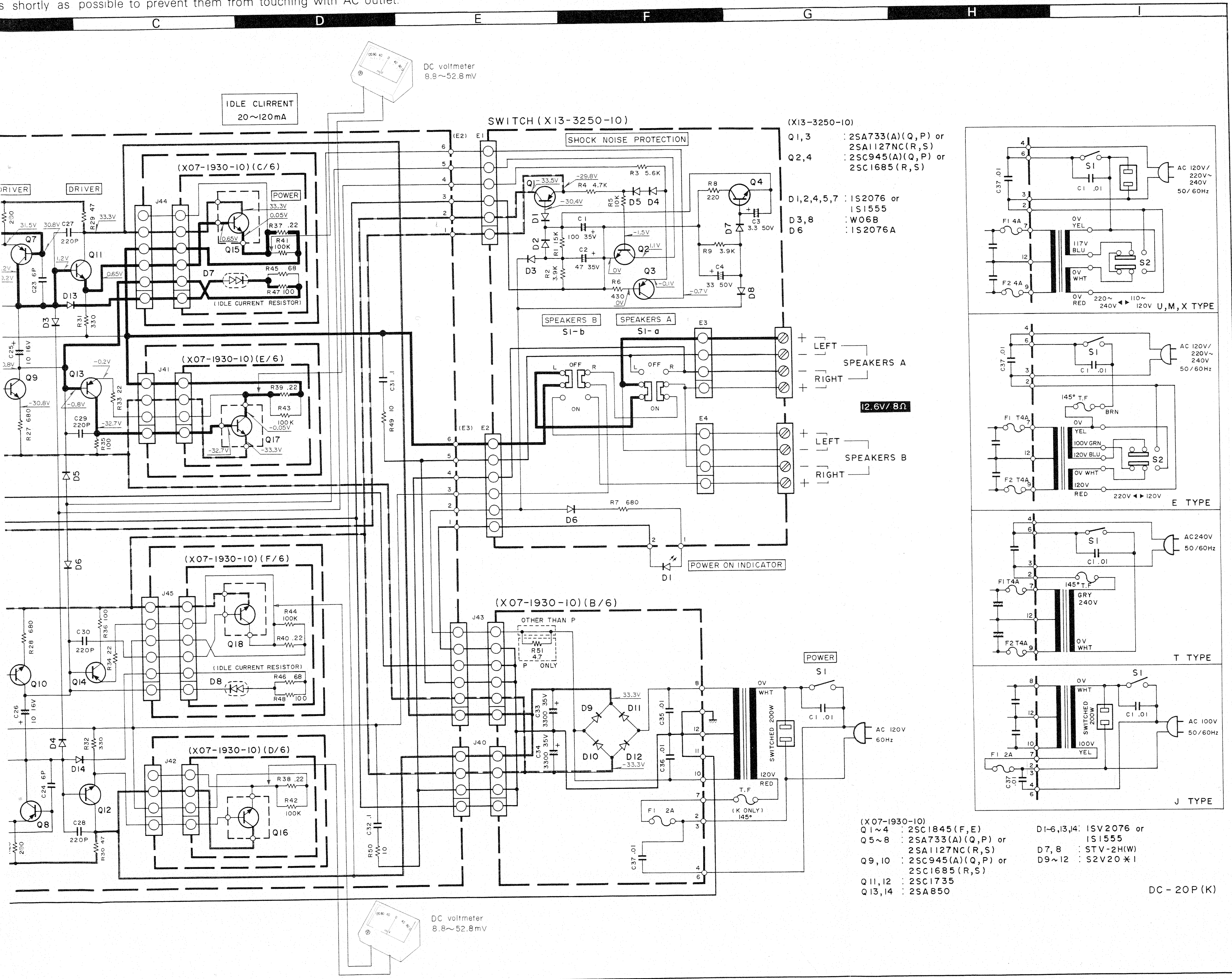

2SA733
2SA1127
2SC945
2SC1845
2SC1685
E C B
2SA850
2SC1735
E C B
2SD716
E C B


A
B
C
D
E
F
G
H
I
1
2
3
4
5
6
DC voltmeter 8.8~52.8mV
IDLE CURRENT 20~120mA
POWER AMP (X07-1930-10)(A/6)
SWITCH (X13-3250-10)
SHOCK NOISE PROTECTION
(X13-3250-10)
Q1,3 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q2,4 : 2SC945(A)(Q,P) or 2SC1685(R,S)
D1,2,4,5,7 : 1S2076 or 1S1555
D3,8 : W06B
D6 : 1S2076A
PRE-DRIVER
DRIVER
POWER
(X07-1930-10)(C/6)
(X07-1930-10)(E/6)
(X07-1930-10)(F/6)
(X07-1930-10)(D/6)
(X07-1930-10)(B/6)
IDLE CURRENT RESISTOR
INPUT
150mV
L ch
R ch
SPEAKERS B S1-b
SPEAKERS A S1-a
SPEAKERS A
SPEAKERS B
LEFT
RIGHT
12.6V/8Ω
POWER ON INDICATOR
OTHER THAN P
P ONLY
POWER S1
AC 120V 60Hz
SWITCHED 200W
T.F (K ONLY) 145°
F1 2A
AC 120V/220V~240V 50/60Hz
U,M,X TYPE
E TYPE
AC240V 50/60Hz
T TYPE
AC 100V 50/60Hz
J TYPE
(X07-1930-10)
Q1~4 : 2SC1845(F,E)
Q5~8 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q9,10 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q11,12 : 2SC1735
Q13,14 : 2SA850
D1~6,13,14 : 1SV2076 or 1S1555
D7,8 : STV-2H(W)
D9~12 : S2V20 ✱1
DC-20P(K)

STEREO POWER AMPLIFIER

DC-20P

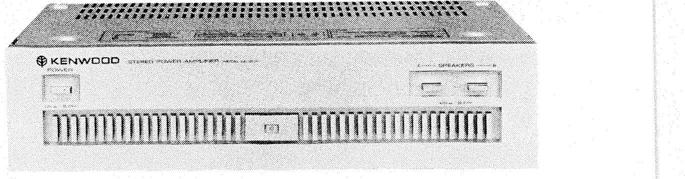
s shortly as possible to prevent them from touching with AC outlet.


C
D
E
F
G
H
I
DC voltmeter 8.8∼52.8mV
IDLE CURRENT 20∼120mA
SWITCH (X13-3250-10)
SHOCK NOISE PROTECTION
(X07-1930-10) (C/6)
(X07-1930-10) (E/6)
(X07-1930-10) (F/6)
(X07-1930-10) (D/6)
(X07-1930-10) (B/6)
DRIVER
POWER
IDLE CURRENT RESISTOR
SPEAKERS B S1-b
SPEAKERS A S1-a
LEFT
RIGHT
SPEAKERS A
SPEAKERS B
12.6V/8Ω
POWER ON INDICATOR
OTHER THAN P
P ONLY
POWER S1
AC 120V 60Hz
SWITCHED 200W
T.F (K ONLY) 145°
F1 2A
OFF
ON
(X13-3250-10)
Q1,3 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q2,4 : 2SC945(A)(Q,P) or 2SC1685(R,S)
D1,2,4,5,7 : 1S2076 or 1S1555
D3,8 : W06B
D6 : 1S2076A
AC 120V/ 220V∼ 240V 50/60Hz
U,M,X TYPE
E TYPE
AC240V 50/60Hz
T TYPE
AC 100V 50/60Hz
J TYPE
DC voltmeter 8.8∼52.8mV

(X07-1930-10)
Q1∼4 : 2SC1845(F,E)
Q5∼8 : 2SA733(A)(Q,P) or 2SA1127NC(R,S)
Q9,10 : 2SC945(A)(Q,P) or 2SC1685(R,S)
Q11,12 : 2SC1735
Q13,14 : 2SA850

D1∼6,13,14 : 1SV2076 or 1S1555
D7,8 : STV-2H(W)
D9∼12 : S2V20 ✱1

DC-20P (K)



SPECIFICATIONS

POWER AMPLIFIER SECTION

Power Output

20 watts* per channel minimum RMS, both channels driven at 8 ohms from 40 Hz to 20,000 Hz with no more than 0.1% total harmonic distortion.

Total Harmonic Distortion (40 Hz to 20 kHz from POWER-IN)	
rated power into 8 ohms	0.1%
1/2 watt power into 8 ohms	0.07%
Intermodulation Distortion (60 Hz : 7 kHz=4 : 1 SMPTE)	
rated power into 8 ohms	0.02%
Damping Factor	35 at 1 kHz, 8 ohms
Input Sensitivity/Impedance	
POWER-IN	150 mV/50 kohms
Signal-to-Noise Ratio (A weighted)	
POWER-IN	100 dB for 150 mV input
Frequency Response	10 Hz to 100 kHz +0 dB, −3 dB

GENERAL

Power Consumption	1A (UL and CSA) 120W (IEC) 120W (8 ohms at rated power)
AC Outlet	Switched 1
Dimensions (DC-20P + DC-20X)	W: 290 mm (11-13/32") H: 309 mm (12-5/32") D: 150 mm (5-29/32")
Weight (Net)	3.5 kg (7.7 lb)

* Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier in U.S.A.

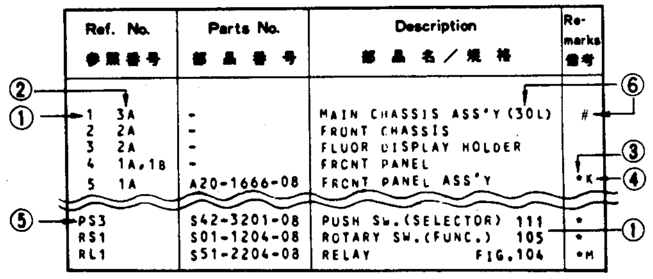
Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

Kenwood strebt ständige Verbesserungen in der Entwichklung an. Daher bleiben Änderungen der technischen Daten Jederzeit vobehalten.

- DC voltages are measured by a VOM of 20 kΩ/V input impedance.
- Les tensions de courant continu sont measurées par un multimètre d'une impédance d'entrée de 20 kΩ/V.
- Die Gleichstrom-Spannungen werden durch ein Vielfachmeßgerät von 20 kΩ/V Eingangs-Impedanz gemessen.

INSTRUCTION FOR PARTS LIST



Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
1 3A	-	MAIN CHASSIS ASS'Y (30L)	#
2 2A	-	FRONT CHASSIS	
3 2A	-	FLUOR DISPLAY HOLDER	
4 1A,1B	-	FRONT PANEL	
5 1A	A20-1666-08	FRONT PANEL ASS'Y	*K
PS3	S42-3201-08	PUSH SW.(SELECTOR) 111	*
RS1	S01-1204-08	ROTARY SW.(FUNC.) 105	*
RL1	S51-2204-08	RELAY FIG.104	*M

① Exploded view drawing No.
② Position in exploded view.
③ Symbol of new parts
④ Area to which parts are shipped. Example: A20-1666-08 is the part No. of FRONT PANEL ASS'Y for the "K" type products (for U.S.A.) When this column is blank, it means that the same type of parts (same parts No.) are used for the products shipped to all areas.
⑤ Reference No. in schematic diagram.
⑥ (30L) and # are KT30L

Abbreviations

* Abbreviations of capacitors (Parts No. with initial letter "C").

ELECTRO	Electrolytic capacitor
LL-ELEC	Low leak electrolytic capacitor
NP-ELEC	Non-pole electrolytic capacitor
MICA	Mica capacitor
POLYSTY	Polystyrene capacitor
MYLAR	Mylar capacitor
CERAMIC	Ceramic capacitor
TANTAL	Tantalum capacitor
MF	Metallized film capacitor
MP	Metallized paper capacitor
OIL	Oil capacitor

The unit "UF" is used in lieu of "μF"

* Abbreviations of resistors (Parts No. with initial letters "R").

RC	Carbon composition resistor	
RD	Carbon film resistor	
FL-PROOF RD	Flame-proof carbon film resistor	
RW	Wire wound power resistor	
FL-PROOF RS	Flame-proof metal oxide film resistor	
RN	Metal film resistor	
FUSE-RESIST	Resistor with fuse function	
2B	Rated wattage	1/8W
2E	Rated wattage	1/4W
2H	Rated wattage	1/2W
3A	Rated wattage	1W
3D	Rated wattage	2W
3F	Rated wattage	3W
3G	Rated wattage	4W
3H	Rated wattage	5W

All resistor values are indicated with the unit (Ω) omitted.

* Abbreviations common to capacitors and resistors.

C	±0.25pF (Used for capacitors only)
D	±0.5pF (Used for capacitors only)
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
Z	+80%, −20%(Used for capacitors only)
P	+100%, −0%(Used for capacitors only)

Resistors RD (carbon composition resistors) are not listed in the parts list. For values, refer to the schematic diagram.

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
DC-20P(UNIT)	**K:USA X:AUSTRARIA P.CANADA T:ENGLAND UE:AAFES H:AUDIO CLUB U:PX E:SCANDINAVIA & EUROPE M:OTHER AREAS**		
1 3B	NO STOCK	MAIN CHASSIS	
2 2B	NO STOCK	HEAT SINK	
11 1B	A01-0414-03	METALLIC CABINET	*
12 3A	A20-1856-03	FRONT PANEL *KPUMXH	UE
12 3A	A20-1857-03	FRONT PANEL	*T
12 3A	A20-1885-03	FRONT PANEL	*E
13 3A	A22-0302-02	SUB PANEL	*
-	B46-0055-30	WARRANTY CARD	
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B46-0062-30	WARRANTY CARD UE	UH
-	B46-0063-13	WARRANTY CARD UE	UH
-	B46-0064-20	WARRANTY CARD	X
-	B46-0078-03	WARRANTY CARD	E
-	B50-3398-00	INSTRUCT MANUAL(E) *PUMXH	UE
-	B50-3399-00	INSTRUCT MANUAL(F) *P	MA
-	B50-3400-00	INSTRUCT MANUAL(SP)	*M
-	B50-3401-00	INSTRUCT MANUAL(E)	*T
-	B50-3402-00	INSTRUCT MANUAL(4-LANG)	*E
-	B50-3441-00	INSTRUCT MANUAL(E)	*K
-	B59-0018-00	SERVICE STATIONS LIST UH	UE
14 2A	B30-0301-05	LED	*
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	UM
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	HX
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	UE
C1 2A	C91-0079-05	CERAMIC 0.01UF AC125V	KP
C1 2A	C91-0079-05	CERAMIC 0.01UF AC125V	TE
15 3B	E03-0018-05	AC OUTLET KUMXH	UE
15 3B	E03-0042-05	AC OUTLET	P
16 3B	E20-0448-05	TERMINAL BOARD	*
17 3B	E30-0181-05	POWER CORD	KP
17 3B	E30-0459-05	POWER CORD	E
17 3B	E30-0545-05	POWER CORD UMH	UE
17 3B	E30-0587-15	POWER CORD	T
17 3B	E30-0649-05	POWER CORD	X
-	H01-3335-04	CARTON BOX *KPUMXEH	UE
-	H01-3336-04	CARTON BOX	*T
-	H10-1592-03	POLYSTYRENE FIXTURE	*
-	H10-1593-03	POLYSTYRENE FIXTURE	*
-	H25-0078-04	BAG (235X315)	
-	H25-0182-14	BAG	
-	H39-0019-05	HANDLE	
18 3A,3B	J02-0109-05	FOOT	
19 3B	J42-0083-05	POWER CORD BUSHING KPUM	TE
19 3B	J42-0083-05	POWER CORD BUSHING H	UE
19 3B	J42-0085-05	POWER CORD BUSHING	X
20 2A,2B	K27-0632-04	KNOB(POWER,SP)	
21 2B	L01-2451-05	POWER TRANSFORMER	*K
21 2B	L01-2452-05	POWER TRANSFORMER	*T
21 2B	L01-2455-05	POWER TRANSFORMER *UMXH	UE
21 2B	L01-2456-05	POWER TRANSFORMER	*E
21 2B	L01-2457-05	POWER TRANSFORMER	*P
22 1A,1B	N09-0373-05	SCREW M3X6(BI-TAP)SLV	
S1 2A	S40-1034-05	PUSH SWITCH(POWER)UMXEH	UE
S1 2A	S40-1035-05	PUSH SWITCH(POWER)	KP
S1 2A	S40-1037-05	PUSH SWITCH(POWER)	TE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	UM
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	XE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	UE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	H
23 2B	V04-0716-00	2SD716	
24 2A,3B	X07-1930-10	POWER AMP PCB ASSY	*K
24 2A,3B	X07-1930-81	POWER AMP PCB ASSY*UMXH	UE
24 2A,3B	X07-1931-01	POWER AMP PCB ASSY	*P
24 2A,3B	X07-1932-71	POWER AMP PCB ASSY *	TE
25 2B	X13-3250-01	AUXILIARY PCB ASSY*UMXH	TE
25 2B	X13-3250-01	AUXILIARY PCB ASSY	UE
25 2B	X13-3250-10	AUXILIARY PCB ASSY *	KP
POWER AMP(X07-1930-10) K:0-10 U:0-81 P:1-01 E:2-71			
-	212-1016-05	PLASTIC TUBE	
C3 ,4	C25-1710-57	LL-ELEC 1UF 50WV	
C5 ,6	C24-6522-71	ELECTRO 220UF 35WV	
C7 ,8	C52-1733-16	CERAMIC 330PF K	
C11 ,12	C52-1710-26	CERAMIC 0.001UF K	
C17 ,18	C24-1047-69	ELECTRO 47UF 10WV	
C19 ,20	C71-1703-01	CERAMIC 3PF C	
C21 ,22	C71-1709-02	CERAMIC 9PF D	
C23 ,24	C71-1706-02	CERAMIC 6PF D	
C25 ,26	C24-1210-69	ELECTRO 10UF 16WV	
C27 -30	C71-1722-15	CERAMIC 220PF J	
C31 ,32	C46-1710-45	MYLAR 0.1UF J	
C33 ,34	C90-0558-05	ELECTRO 3300UF 35WV	
C35 ,36	C54-2710-39	CERAMIC 0.01UF P	
C37	C91-0023-05	CERAMIC 0.01UF AC250V	U
C37	C91-0079-05	CERAMIC 0.01UF AC125V	KPE
-	E23-0077-05	TERMINAL	
101 2B	E13-0215-05	PHONO JACK	*
F1 ,2	F05-4022-05	FUSE 250V 4A	U
F1 ,2	F05-4025-05	FUSE 250V T4A	E
F1	F06-2027-05	FUSE 250V 2A	KP
-	J13-0041-05	FUSE HOLDER K	UP
-	J13-0054-05	FUSE HOLDER	E
R19 ,20	R42-1256-25	FL-PROOF RD5.6K J 2E	
R23 ,24	R42-1220-15	FL-PROOF RD200 J 2E	
R29 ,30	R42-1247-05	FL-PROOF RD47 J 2E	
R31 ,32	R42-1233-15	FL-PROOF RD330 J 2E	
R33 ,34	R42-1222-05	FL-PROOF RD22 J 2E	
R35 ,36	R42-1210-15	FL-PROOF RD100 J 2E	
R37 -40	R92-0166-05	METAL-PLATE0.22 K 3D	
R49 ,50	R47-5510-05	FL-PROOF RS10 J 3D	
D1 -6	V11-0076-05	1S1555	
D1 -6	V11-0271-05	1S2076	
D7 ,8	V11-5100-80	STV-2H(W)	
D9 -12	V11-1301-40	S2V20*1	
D13 ,14	V11-0076-05	1S1555	
D13 ,14	V11-0271-05	1S2076	
Q1 -4	V03-1845-10	2SC1845(F,E)	
Q5 -8	V01-0733-40	2SA733(A)(Q,P)	
Q5 -8	V01-1127-30	2SA1127NC(R,S)	
Q9 ,10	V03-0945-51	2SC945(A)(Q,P)	
Q9 ,10	V03-1685-20	2SC1685(R,S)	
Q11 ,12	V03-0452-05	2SC1735	
Q13 ,14	V01-0173-05	2SA850	
AUXILIARY(X13-3250-10)			
C1	C24-6510-77	ELECTRO 100UF 35WV	
C2	C24-6547-61	ELECTRO 47UF 35WV	
C3	C24-1733-59	ELECTRO 3.3UF 50WV	
C4	C25-1733-67	LL-ELEC 33UF 50WV	
R7	R40-8368-16	RC 680 K 2H	
S1	S42-2052-05	PUSH SWITCH FIG201	*
D1 ,2	V11-0076-05	1S1555	
D1 ,2	V11-0271-05	1S2076	
D3	V11-0295-05	W06B	
D4 ,5	V11-0076-05	1S1555	
D4 ,5	V11-0271-05	1S2076	
D6	V11-0273-05	1S2076A	
D7	V11-0076-05	1S1555	
D7	V11-0271-05	1S2076	
D8	V11-0295-05	W06B	
Q1	V01-0733-40	2SA733(A)(Q,P)	
Q1	V01-1127-30	2SA1127NC(R,S)	
Q2	V03-0945-51	2SC945(A)(Q,P)	
Q2	V03-1685-20	2SC1685(R,S)	
Q3	V01-0733-40	2SA733(A)(Q,P)	
Q3	V01-1127-30	2SA1127NC(R,S)	
Q4	V03-0945-51	2SC945(A)(Q,P)	
Q4	V03-1685-20	2SC1685(R,S)	

PARTS LI

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
DC-20P(UNIT)		K:USA X:AUSTRARIA P.CANADA T:ENGLAND UE:AAFES H:AUDIO CLUB U:PX E:SCANDINAVIA & EUROPE M:OTHER AREAS	
1 3B	NO STOCK	MAIN CHASSIS	
2 2B	NO STOCK	HEAT SINK	
11 1B	A01-0414-03	METALLIC CABINET	*
12 3A	A20-1856-03	FRONT PANEL *KPUMXH	UE
12 3A	A20-1857-03	FRONT PANEL	*T
12 3A	A20-1885-03	FRONT PANEL	*E
13 3A	A22-0302-02	SUB PANEL	*
-	B46-0055-30	WARRANTY CARD	
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B46-0062-30	WARRANTY CARD UE	UH
-	B46-0063-13	WARRANTY CARD UE	UH
-	B46-0064-20	WARRANTY CARD	X
-	B46-0078-03	WARRANTY CARD	E
-	B50-3398-00	INSTRUCT MANUAL(E) *PUMXH	UE
-	B50-3399-00	INSTRUCT MANUAL(F) *P	MA
-	B50-3400-00	INSTRUCT MANUAL(SP)	*M
-	B50-3401-00	INSTRUCT MANUAL(E)	*T
-	B50-3402-00	INSTRUCT MANUAL(4-LANG)	*E
-	B50-3441-00	INSTRUCT MANUAL(E)	*K
-	B59-0018-00	SERVICE STATIONS LIST UH	UE
14 2A	B30-0301-05	LED	*
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	UM
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	HX
C1 2A	C91-0023-05	CERAMIC 0.01UF AC250V	UE
C1 2A	C91-0079-05	CERAMIC 0.01UF AC125V	KP
C1 2A	C91-0079-05	CERAMIC 0.01UF AC125V	TE
15 3B	E03-0018-05	AC OUTLET KUMXH	UE
15 3D	E03-0042-05	AC OUTLET	P
16 3B	E20-0448-05	TERMINAL BOARD	*
17 3B	E30-0181-05	POWER CORD	KP
17 3B	E30-0459-05	POWER CORD	E
17 3B	E30-0545-05	POWER CORD UMH	UE
17 3B	E30-0587-15	POWER CORD	T
17 3B	E30-0649-05	POWER CORD	X
-	H01-3335-04	CARTON BOX *KPUMXEH	UE
-	H01-3336-04	CARTON BOX	*T
-	H10-1592-03	POLYSTYRENE FIXTURE	*
-	H10-1593-03	POLYSTYRENE FIXTURE	*
-	H25-0078-04	BAG (235X315)	
-	H25-0182-14	BAG	
-	H39-0019-05	HANDLE	
18 3A,3B	J02-0109-05	FOOT	
19 3B	J42-0083-05	POWER CORD BUSHING KPUM	TE
19 3B	J42-0083-05	POWER CORD BUSHING H	UE
19 3D	J42-0085-05	POWER CORD BUSHING	X
20 2A,2B	K27-0632-04	KNOB(POWER,SP)	
21 2B	L01-2451-05	POWER TRANSFORMER	*K
21 2D	L01-2452-05	POWER TRANSFORMER	*T
21 2B	L01-2455-05	POWER TRANSFORMER *UMXH	UE
21 2B	L01-2456-05	POWER TRANSFORMER	*E
21 2D	L01-2457-05	POWER TRANSFORMER	*P
22 1A,1B	N09-0373-05	SCREW M3X6(BI-TAP)SLV	
S1 2A	S40-1034-05	PUSH SWITCH(POWER)UMXEH	UE
S1 2A	S40-1035-05	PUSH SWITCH(POWER)	KP
S1 2A	S40-1037-05	PUSH SWITCH(POWER)	TE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	UM
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	XE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	UE
S2	S31-2053-05	SLIDE SWITCH(POWER SEL)	H
23 2B	V04-0716-00	2SD716	
24 2A,3D	X07-1930-10	POWER AMP PCB ASSY	*K
24 2A,3B	X07-1930-81	POWER AMP PCB ASSY*UMXH	UE
24 2A,3B	X07-1931-01	POWER AMP PCB ASSY	*P
24 2A,3B	X07-1932-71	POWER AMP PCB ASSY *	TE
25 2B	X13-3250-01	AUXILIARY PCB ASSY*UMXH	TE
25 2E	X13-3250-01	AUXILIARY PCB ASSY	UE
25 2B	X13-3250-10	AUXILIARY PCB ASSY *	KP

POWER AMP(X07-1930-10) K:0-10 U:0-81 P:1-01 E:2-71

Ref. No.	Parts No.	Description	Remarks
-	212-1016-05	PLASTIC TUBE	
C3 ,4	C25-1710-57	LL-ELEC 1UF 50WV	
C5 ,6	C24-6522-71	ELECTRO 220UF 35WV	
C7 ,8	C52-1733-16	CERAMIC 330PF K	
C11 ,12	C52-1710-26	CERAMIC 0.001UF K	
C17 ,18	C24-1047-69	ELECTRO 47UF 10WV	
C19 ,20	C71-1703-01	CERAMIC 3PF C	
C21 ,22	C71-1709-02	CERAMIC 9PF D	
C23 ,24	C71-1706-02	CERAMIC 6PF D	
C25 ,26	C24-1210-69	ELECTRO 10UF 16WV	
C27 -30	C71-1722-15	CERAMIC 220PF J	
C31 ,32	C46-1710-45	MYLAR 0.1UF J	
C33 ,34	C90-0558-05	ELECTRO 3300UF 35WV	
C35 ,36	C54-2710-39	CERAMIC 0.01UF P	
C37	C91-0023-05	CERAMIC 0.01UF AC250V	U
C37	C91-0079-05	CERAMIC 0.01UF AC125V	KPE
-	E23-0077-05	TERMINAL	
101 2B	E13-0215-05	PHONO JACK	*
F1 ,2	F05-4022-05	FUSE 250V 4A	U
F1 ,2	F05-4025-05	FUSE 250V T4A	E
F1	F06-2027-05	FUSE 250V 2A	KP
-	J13-0041-05	FUSE HOLDER K	UP
-	J13-0054-05	FUSE HOLDER	E
R19 ,20	R42-1256-25	FL-PROOF RD5.6K J 2E	
R23 ,24	R42-1220-15	FL-PROOF RD200 J 2E	
R29 ,30	R42-1247-05	FL-PROOF RD47 J 2E	
R31 ,32	R42-1233-15	FL-PROOF RD330 J 2E	
R33 ,34	R42-1222-05	FL-PROOF RD22 J 2E	
R35 ,36	R42-1210-15	FL-PROOF RD100 J 2E	
R37 -40	R92-0166-05	METAL-PLATE0.22 K 3D	
R49 ,50	R47-5510-05	FL-PROOF RS10 J 3D	
D1 -6	V11-0076-05	1S1555	
D1 -6	V11-0271-05	1S2076	
D7 ,8	V11-5100-80	STV-2H(W)	
D9 -12	V11-1301-40	S2V20*1	
D13 ,14	V11-0076-05	1S1555	
D13 ,14	V11-0271-05	1S2076	
Q1 -4	V03-1845-10	2SC1845(F,E)	
Q5 -8	V01-0733-40	2SA733(A)(Q,P)	
Q5 -8	V01-1127-30	2SA1127NC(R,S)	
Q9 ,10	V03-0945-51	2SC945(A)(Q,P)	
Q9 ,10	V03-1685-20	2SC1685(R,S)	
Q11 ,12	V03-0452-05	2SC1735	
Q13 ,14	V01-0173-05	2SA850	

AUXILIARY(X13-3250-10)

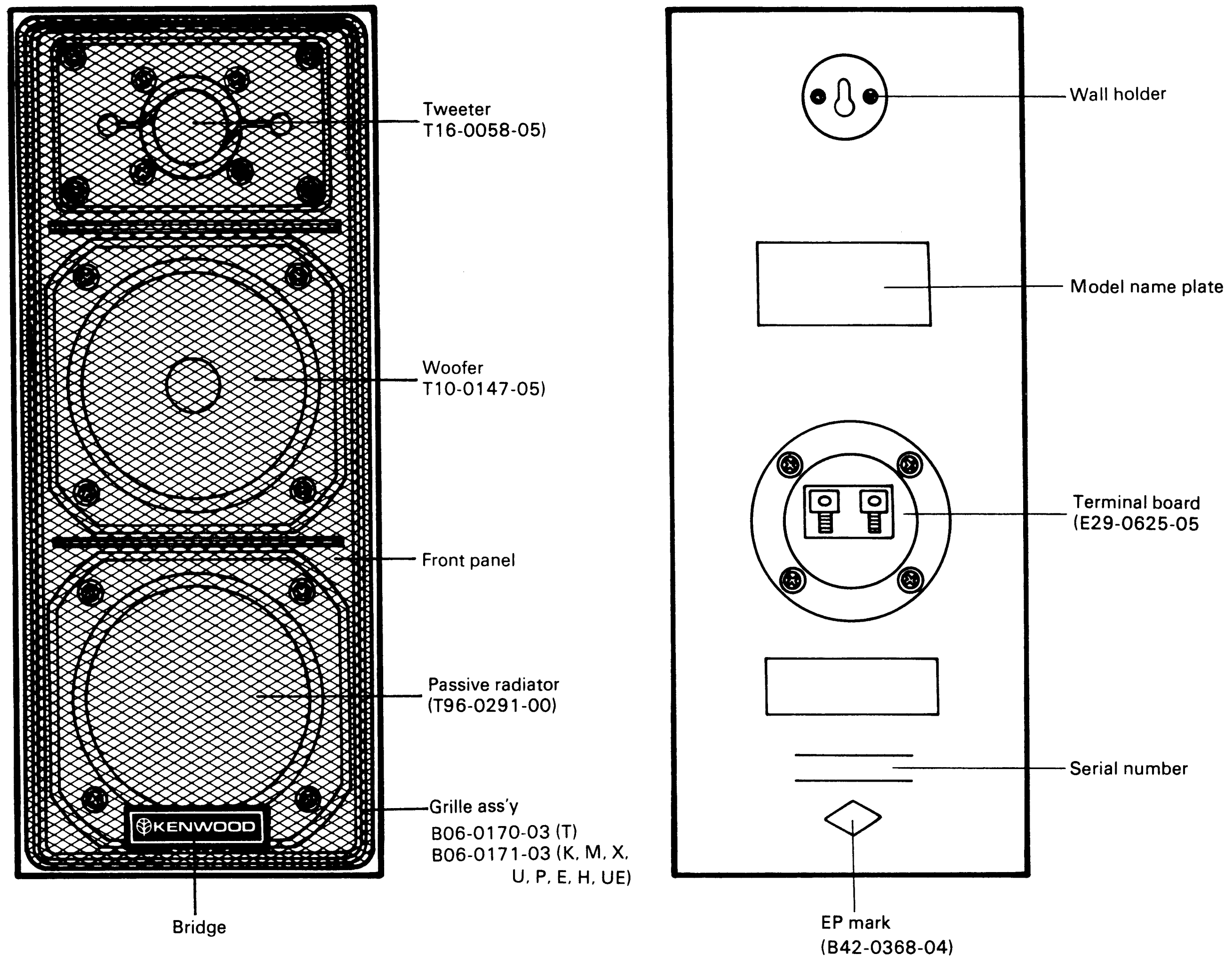
Ref. No.	Parts No.	Description	Remarks
C1	C24-6510-77	ELECTRO 100UF 35WV	
C2	C24-6547-61	ELECTRO 47UF 35WV	

PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
C3	C24-1733-59	ELECTRO 3.3UF 50WV	
C4	C25-1733-67	LL-ELEC 33UF 50WV	
R7	R40-8368-16	RC 680 K 2H	
S1	S42-2052-05	PUSH SWITCH FIG201	*
D1 ,2	V11-0076-05	1S1555	
D1 ,2	V11-0271-05	1S2076	
D3	V11-0295-05	W06B	
D4 ,5	V11-0076-05	1S1555	
D4 ,5	V11-0271-05	1S2076	
D6	V11-0273-05	1S2076A	
D7	V11-0076-05	1S1555	
D7	V11-0271-05	1S2076	
D8	V11-0295-05	W06B	
Q1	V01-0733-40	2SA733(A)(Q,P)	
Q1	V01-1127-30	2SA1127NC(R,S)	
Q2	V03-0945-51	2SC945(A)(Q,P)	
Q2	V03-1685-20	2SC1685(R,S)	
Q3	V01-0733-40	2SA733(A)(Q,P)	
Q3	V01-1127-30	2SA1127NC(R,S)	
Q4	V03-0945-51	2SC945(A)(Q,P)	
Q4	V03-1685-20	2SC1685(R,S)	

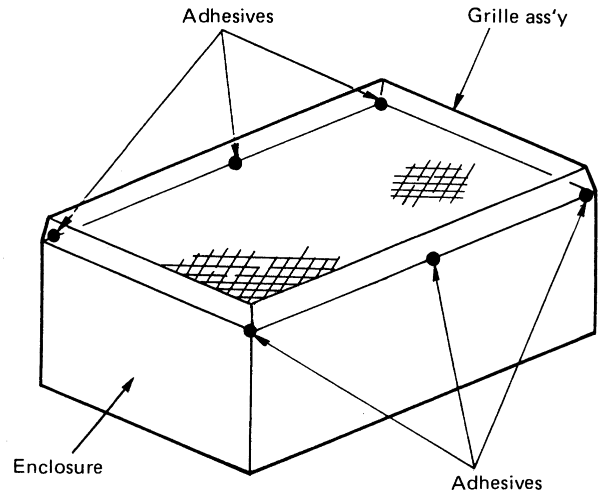
DC-20S

EXTERNAL VIEW

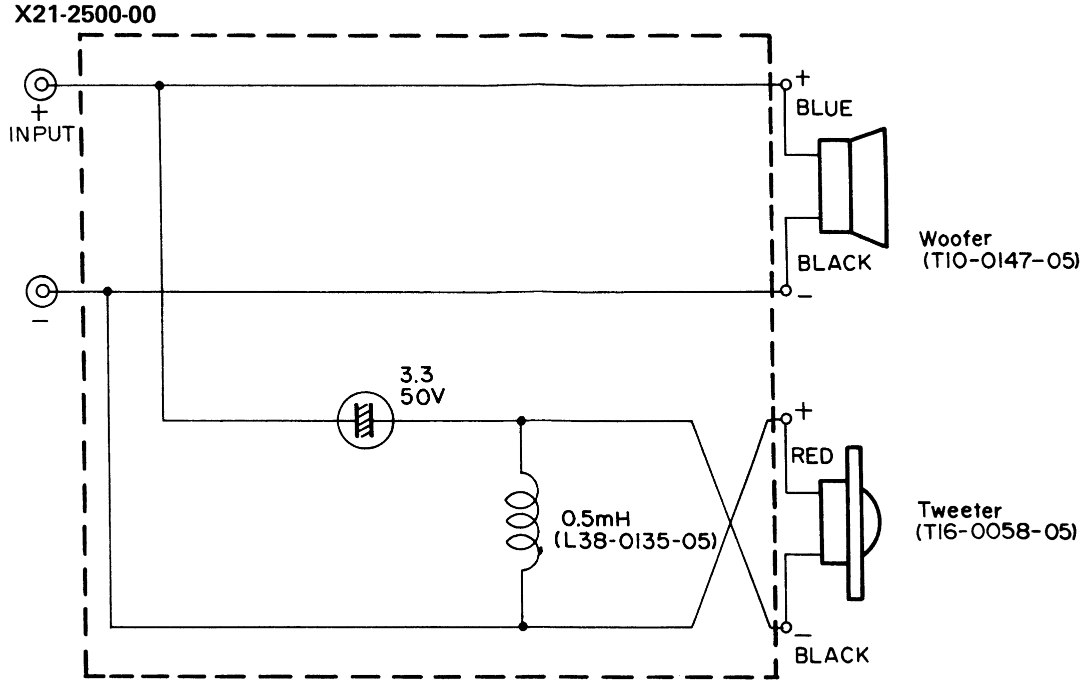

Tweeter
T16-0058-05)
Woofer
T10-0147-05)
Front panel
Passive radiator
(T96-0291-00)
Grille ass'y
B06-0170-03 (T)
B06-0171-03 (K, M, X, U, P, E, H, UE)
KENWOOD
Bridge
Wall holder
Model name plate
Terminal board
(E29-0625-05
Serial number
EP mark
(B42-0368-04)

Removal of Grille ass'y

The grille ass'y is bonded to the enclosure.
When removing the grille ass'y, warm up the adhesives by a hair drier so that the adhesives will become soft.
Then the grille ass'y can be removed.


Adhesives
Grille ass'y
Enclosure
Adhesives

SCHEMATIC DIAGRAM


X21-2500-00
+
INPUT
−
BLUE
+
BLACK
−
Woofer
(T10-0147-05)
3.3
50V
0.5mH
(L38-0135-05)
RED
+
BLACK
−
Tweeter
(T16-0058-05)

PARTS LIST/SPECIFICATIONS

PARTS LIST

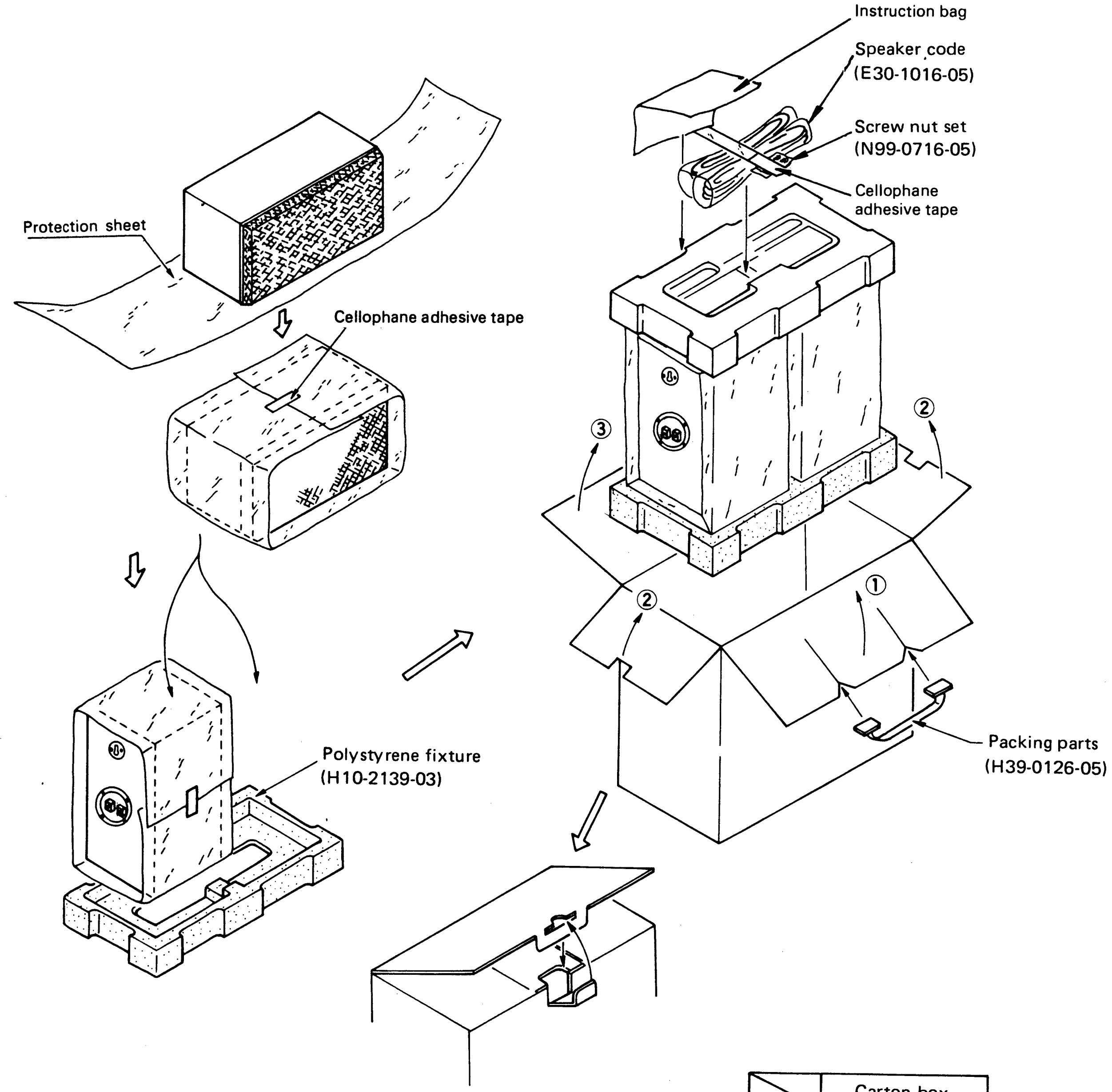
Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
UNIT	K:USA X:AUSTRARIA P:CANADA T:ENGLAND UE:AAFES H:AUDIO CLUB U:PX E:SCANDINAVIA & EUROPE M:OTHER AREAS		
-	B06-0170-03	GRILLE ASSY T	*
-	B06-0171-03	GRILLE ASSY KMXUPEH UE	*
-	B42-0368-04	EP MARK	U
-	B46-0055-30	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B46-0062-30	WARRANTY CARD UH	UE
-	B46-0063-13	WARRANTY CARD	U
-	B46-0064-20	WARRANTY CARD	X
-	B46-0078-03	WARRANTY CARD	E
-	B50-3786-00	INSTRUCT MANUAL(6-LANG)	*K
-	B50-3786-00	INSTRUCT MANUAL(6-LANG)	MX
-	B50-3786-00	INSTRUCT MANUAL(6-LANG)	UP
-	B50-3786-00	INSTRUCT MANUAL(6-LANG)	E
-	B50-3786-00	INSTRUCT MANUAL(6-LANG)	UE
-	B50-3783-00	INSTRUCT MANUAL(ENG)	*T
-	C23-1733-56	ELECTRO 3.3UF 50WV	
-	E29-0625-05	TERMINAL BOARD	*
-	E30-1016-05	SPEAKER CORD	
-	H01-3962-03	CARTON BOX KMXUPEH UE	*
-	H01-3963-03	CARTON BOX	*T
-	H10-2139-03	POLYSTYRENE FIXTURE	*
-	H25-0078-04	BAG (235X315)	
-	H39-0126-05	PACKING PARTS	
-	L38-0135-05	COIL 0.5MH	
-	N99-0716-05	SCREW NUT SET	*
-	T10-0147-05	WOOFER	*
-	T16-0058-05	TWEETER	*
-	T96-0291-00	PASSIVE RADIATOR	*

SPECIFICATIONS

System	2-Way, 2-Speaker, 1-Passive Cone System
Enclosure	Passive Cone Type
Mounted Speakers	
Woofer	100 mm (3-15/16") Cone Type
Tweeter	25 mm (1") Soft Dome Type
Maximum Input Power	30 Watts
Rated Input Power	20 Watts
Frequency Response	70 Hz to 20,000 Hz
Crossover Frequency	3,000 Hz
Impedance	8 ohms
Dimensions	W: 128 mm (5-1/32") H: 309 mm (12-5/32") D: 129 mm (5-3/32")
Weight	5 kg (11 lbs.)

(Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.)

PACKING


Instruction bag
Speaker code
(E30-1016-05)
Screw nut set
(N99-0716-05)
Cellophane
adhesive tape
Protection sheet
Cellophane adhesive tape
③
②
②
①
Polystyrene fixture
(H10-2139-03)
Packing parts
(H39-0126-05)

	Carton box
T	H01-3963-03
Other than T	H01-3962-03

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